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PSYCHOSOCIAL FACTORS ASSOCIATED WITH OUTCOMES FOR PATIENTS UNDERGOING REHABILITATION FOR CHRONIC WHIPLASH ASSOCIATED DISORDERS

par

Petko Baltov

Programme de Sciences Biomédicales

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Psychosocial factors associated with outcomes for patients undergoing rehabilitation for chronic whiplash associated disorders

présenté par:

Petko Baltov

a été évalué par un jury composé des personnes suivantes :

Dre. Bonnie Swaine
Président-rapporteur

Dre. Debbie Feldman
Directeur de recherche

Dre. Marie-José Durand
Membre du jury

RÉSUMÉ

La réadaptation multidisciplinaire semble être bénéfique pour les personnes atteintes de désordres chroniques associés au coup de fouet cervical. Cependant, il existe peu d'information sur les facteurs psychosociaux qui seraient associés au pronostic chez les personnes participant à un programme multidisciplinaire. Nos objectifs étaient: 1) explorer si les facteurs psychosociaux et sociodémographiques et l'incapacité pré-réadaptation prédisent l'incapacité, la détresse psychologique et le pronostic de retour au travail post-réadaptation et 2) évaluer si les patients s'amélioraient après le programme multidisciplinaire en termes d'incapacité et de détresse psychologique. Nous avons réalisé des entrevues avec 28 patients avant le début et à la fin du programme et trois mois après. L'importance de l'incapacité initiale était positivement associée à l'incapacité aux deux suivis ($p<0.001$), et à la détresse au deuxième suivi ($p=0.003$). Les personnes plus jeunes ($p=0.028$) et ayant plus de détresse initiale ($p=0.002$) avaient plus de détresse trois mois post-réadaptation. Au premier suivi, plus de soutien social au travail prédisait le retour au travail ($p=0.04$). Comparativement à la pré-réadaptation, les sujets se sont améliorés aux deux suivis quant à l'incapacité ($p<0.001$) et, au deuxième suivi quant à la détresse ($p=0.03$). L'incapacité pré-réadaptation semble être le seul facteur influençant l'incapacité post-réadaptation. D'un autre côté, les facteurs psychosociaux jouent un rôle dans le pronostic de détresse psychologique et de retour au travail. Les effets des facteurs influençant la récupération suite à un

programme de réadaptation multidisciplinaire doivent être étudiés avec de plus grands effectifs. L'efficacité de ces programmes doit être déterminée dans des essais cliniques randomisés.

Mots-clés: pronostic, risque, douleur au cou, accident de véhicule motorisé, multidisciplinaire, incapacité, retour au travail

ABSTRACT

Multidisciplinary rehabilitation appears to be beneficial for persons with chronic whiplash associated disorders (WAD). Despite this, little is known regarding psychosocial factors associated with improved outcomes in those who undergo multimodal treatment. Our objectives were: 1) to explore whether psychosocial factors, disability, and socio-demographic factors, measured pre-treatment predicted post-treatment disability, psychological distress, and return to work, and 2) to assess whether patients improved following treatment with respect to disability, and psychological distress. We conducted face to face interviews with 28 patients with chronic WAD at entry and completion of the multimodal rehabilitation program, and a telephone interview three months later. Higher initial disability predicted higher disability at both follow-ups ($p<0.001$), and higher psychological distress at program completion ($p=0.003$). Younger age ($p=0.028$) and higher initial psychological distress ($p=0.002$) were associated with higher psychological distress three months post-rehabilitation. Greater social support at work was prognostic of return to work at program completion ($p=0.04$). Comparing to pre-rehabilitation, patients improved in terms of pain and disability at both follow-ups ($p<0.001$), and in terms of psychological distress at the second follow-up ($p=0.03$). Our results indicate that baseline disability is the only factor affecting disability post-rehabilitation. On the other hand, psychosocial factors play a role in the prognosis of psychological distress and return to work. The effect of factors on

the recovery of patients treated in multidisciplinary environments should be explored in studies with large cohorts. The effectiveness of multimodal programs should be determined in randomized controlled trials.

Keywords: prognosis, risk, neck pain, motor vehicle accident, multidisciplinary, disability, return to work

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LIST OF ABBREVIATIONS

CRIR	Centre for Interdisciplinary Research in Rehabilitation
CSQ	Coping Strategies Questionnaire
ES	Effect Size
G	Force of Gravitation
GHQ	General Health Questionnaire
HPP	Handicap Production Process
ICC	Intra-class Correlation Coefficient
JCQ	Job Content Questionnaire
MVA	Motor Vehicle Accident
NDI	Neck Disability Index
PEDIP	Evaluation, Development and Professional Reintegration Program
PSP	Personalized Care Program for Sprains and Muscular Injuries
QOL	Quality of Life
QTF	Quebec Task Force
r	Pearson Correlation Coefficient
RFN	Radio-Frequency Neurotomy
ROM	Range of Motion
SAAQ	Société d'Assurance Automobile du Québec
SRM	Standardized Response Mean
SWLS	Satisfaction with Life Scale
TSK	Tampa Scale for Kinesiophobia

US	United States
VAS	Visual Analogue Scale
WAD	Whiplash Associated Disorders

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CHAPTER 1

INTRODUCTION AND STUDY OBJECTIVES

1.1 Introduction

Whiplash is an acceleration-decceleration mechanism of energy transfer to the neck (1). To describe the clinical manifestations of, or the disability caused by the injury, the term whiplash associated disorders (WAD) was introduced by the Quebec Task Force (QTF) (1). Motor vehicle accidents are often cited as the principal cause of whiplash. Between 10 to 48% of the drivers who have had an accident develop WAD (2-4). The incidence of whiplash injury varies in different parts of the world and even between different provinces of Canada (1;5-10). In Quebec the incidence rate reported by Spitzer et al. in 1995 was 70 per 100 000 inhabitants (1) and in Canada there are an estimated 100 000 new cases per year (11). Between 14-66% of the subjects suffering from WAD develop chronic symptoms (12-14), and 13–50% of the patients do not return to work or are unable to perform their usual duties at six months post injury (15;16). People with chronic WAD contribute substantially to the significant economic costs related to this condition. Insurance companies worldwide report that 68–85% of their total claim disbursements for motor vehicle accident (MVA) injuries are for chronic injuries to the neck and back (17). In the United States alone, the economic impact of WAD is estimated to be 4.5 billion US$ per year (18).

It is of crucial importance to investigate factors which predict the prognosis of WAD in order to identify the subjects at risk for prolonged disability. The identification of these predictors is the first step in preventing persistent symptoms. Scientific information on the prognosis of chronic whiplash will improve the understanding of the disease process, and guide clinical decision making, including treatment selection and patient counseling (19).

Physical and crash-related factors affect the prognosis of WAD (3;10;16;20-34;34-38). In particular, high initial neck pain is a factor significantly associated with WAD chronicity (10;23). However, WAD is not only a physical problem, it is also influenced by psychological factors (39-41), social policy, and by insurance and legal systems (8;41-45). It is also believed that psychosocial factors may play an important role in the development of the chronicity of spinal injuries (46) and in return to work (47).

Accumulating scientific evidence supports the multidisciplinary approach in the medical treatment of patients with subacute or chronic musculosceletal pain, including chronic WAD (48-59). Despite this fact there is a lack of studies regarding psychosocial and socio-demographic predictors of outcome in patients with chronic WAD who undergo treatment in a multimodal program. Research is mainly focused on the predictors of the transition from the acute to the chronic condition. To date, only two studies have explored factors associated with outcome in persons with chronic WAD treated in a multidisciplinary environment. Heikkila et al. found that

the elapse of time since working, low life satisfaction, lack of increase in coping resources during the rehabilitation program, ethnic origin other than that of the majority and living in a rural area predicted delay in return to work or training two years after the end of the rehabilitation program (56). However, the subjects in this study were not only patients with WAD but also patients with musculoskeletal pain in the neck or back. Moreover, only two psychosocial factors were investigated as potential predictors – coping with the pain and life satisfaction, and the outcome was return to work or school with no attention paid by the authors to the level of pain and disability. Stewart et al. discovered that higher baseline levels of pain and disability were associated with greater treatment effects on pain intensity in patients undergoing treatment in a program combining exercise and behavioral treatment (58). However, Stewart et al. considered only one potential psychosocial risk factor: fear of movement.

The present research aims to study potential predictors of outcome in patients with chronic WAD who are undergoing a multidisciplinary personalized care treatment program for sprains and muscular injuries (PSP) offered by the Evaluation, Development and Professional Reintegration Program (PEDIP) of the Jewish Rehabilitation Hospital in Laval, Quebec. We will address numerous psychosocial and socio-demographic factors in persons participating in this highly structured intensive program.

1.2 Objectives

The overall objective of the current study is to identify psychosocial and socio-demographic factors associated with self perceived pain and disability and two secondary outcomes: psychological distress and return to work, in patients with chronic WAD who are treated in a multidisciplinary rehabilitation program.

Specifically our objectives were:

1. To explore whether psychosocial factors such as psychological distress, pain coping strategies, fear of movement, satisfaction with life, social support at work, patients' expectations regarding their return to work, self-perception of blame for the injury and agreement with the authorities on this same matter predicted post-treatment a) self-perceived pain and disability, and two secondary outcomes: b) psychological distress, and c) return to work.
2. To investigate whether level of pain and disability pre-treatment influences post-treatment a) self-perceived pain and disability, and two secondary outcomes: b) psychological distress, and c) return to work.
3. To examine whether socio-demographic factors such as age, sex, ethnicity, marital status, occupation, education and being a driver or a passenger during the motor vehicle accident were associated with post-treatment a) self-perceived pain and disability, and two secondary outcomes: b) psychological distress, and c) return to work.

4. To assess whether patients improved following treatment with respect to a) pain and disability, and b) psychological distress.

1.3 Hypotheses

Hypothesis 1:

Age and self perceived pain and disability at baseline (at start of the rehabilitation program) will be associated with the level of self perceived pain and disability at follow-up.

Hypothesis 2:

Level of psychological distress at baseline will be associated with the level of psychological distress at follow-up.

Hypothesis 3:

Patients' expectations of return to work at baseline will be associated with return to work at follow-up.

CHAPTER 2

LITERATURE REVIEW

2.1 Terminology

Evidence of symptoms that are presently associated with WAD can be traced back to the 1880's when it was discovered that that the so-called railway spine was frequently found among train passengers who were facing opposite the direction of impact during an accident (60). During the First World War it was noted that the impact on the cervical spine caused by emergency ejections of pilots provoked blackouts for several seconds. These accidents were due to a whiplash effect (21). The term whiplash was introduced at a conference in 1928 by the orthopedic surgeon Harold Crowe (61). In 1995 the Quebec Task Force (QTF) on whiplash associated disorders published a comprehensive systematic review of the literature on whiplash in research and in clinical practice (1). They adopted a definition of this traumatic spine injury that is still widely used today. Whiplash is an acceleration-deceleration mechanism of energy transfer to the neck (1). It may result from rear-end or side-impact motor vehicle collisions, but can also occur during diving or other mishaps (1). To describe the clinical manifestations of, or the disability caused by the injury, the QTF introduced the term whiplash associated disorders.

2.2 Epidemiology of WAD

2.2.1 Incidence of WAD

Numerous studies have investigated the incidence of WAD, which varies widely between different parts of the world. Mills and Horne (62) calculated whiplash annual incidence rates of 1 per 1000 inhabitants in Australia's State of Victoria and 0.1 per 1000 in New Zealand in 1986. Schutt and Dohan reported an incidence of approximately 14.5 per 1000 in a population of American women workers (63). In a more recent study the incidence of whiplash injuries was estimated to vary between 1 and 2 per 1000 inhabitants in The Netherlands (64). In Sweden studies report figures from one to 4.2 per 1000 inhabitants (33;65). In countries like Lithuania (44;45) and Greece (66) where litigation is not a common practice, whiplash has been reported to be almost non-existent.

The variability in the incidence estimates can be even found among different provinces in Canada. Spitzer et al. (1) followed a cohort of 4757 subjects who submitted claims for compensation to the Société d'Assurance Automobile du Québec (SAAQ) in 1987. They calculated an annual incidence of compensated whiplash of 0.7 per 1000 inhabitants in Quebec. The authors also found that the annual incidence among female claimants (0.86 per 1000) was more than 1.5 times greater than among male claimants (0.54 per 1000). Cassidy et al. (8) explored the effect of the change of the compensation system for traffic injuries in Saskatchewan, from one that included payments for pain and suffering, to a no-fault system. They studied a population-based cohort of 7462 persons who filed

insurance claims for traffic injuries. The six-month cumulative incidence of claims was 4.17 per 1000 persons in the last six months of the tort system, as compared with 3.02 and 2.96 per 1000, respectively, in the first and second six-month periods of the no-fault system. In a recent report (5), the incidence of disability claims secondary to WAD in British Columbia has been estimated at approximately 9 per 1000 persons. The actual number of new cases of WAD per year in Canada is estimated to be more than 100 000 (11).

Variations in incidence figures could be explained by the different medico-legal systems and societal beliefs regarding WAD prognosis among the different countries and by the different time period in which the studies were executed.

2.2.2 Prevalence of WAD

Barnsley et al. (12) have estimated a 1% prevalence of this condition in the general population taking into account the average age of a person sustaining whiplash and the average life span.

2.2.3 Chronicity of WAD

The Quebec WAD cohort study (1), which included 4757 subjects who submitted insurance claims for compensation, used the duration of compensation as an indicator of disability. The study reported ongoing compensation for 53%, 36%, 13%, and 3% of subjects at one, two, six months, and one year after injury, respectively. On the basis of the reviewed literature and evidence from their cohort

study, the QTF concluded that whiplash is a benign condition with favorable prognosis for most patients. This conclusion has been criticized (14) since studies reviewed in the QTF report indicated that in patients who were initially symptomatic after motor vehicle accidents (MVA), the prevalence of ongoing symptoms was 27% to 66% at six months, and subsequent reports showed a prevalence of 44% at two years after injury.

In a more recent report on whiplash Barnsley et al. (12) reviewed studies that assembled an inception cohort. The authors concluded that between 14% and 42% of persons with whiplash injuries develop chronic neck pain and that approximately 10% have constant severe pain.

2.2.4 Cost of WAD

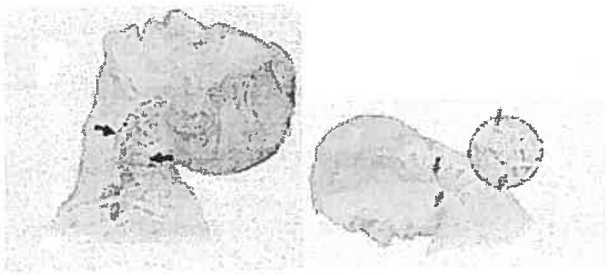
Disability from WAD represents a significant economic burden for society in terms of claim payments, medical care, disability pension, income loss, and lost income tax (33). Insurance companies worldwide claim that 68–85% of their total disbursements for motor vehicle crash injuries are for chronic injuries to the neck and back (17). In the United States alone, the economic impact of WAD is estimated to be 4.5 billion US$ per year (18). The cohort of 4757 whiplash claimants studied by Spitzer et al. cost the SAAQ a total of over 18 million dollars in reimbursements and compensation only, without accounting for the costs generated by absence from work. A more recent study in the province of Quebec

estimated that the cost of the usual treatment of a person who has sustained whiplash injury is approximately $5660 (151).

2.3 Mechanism of Injury

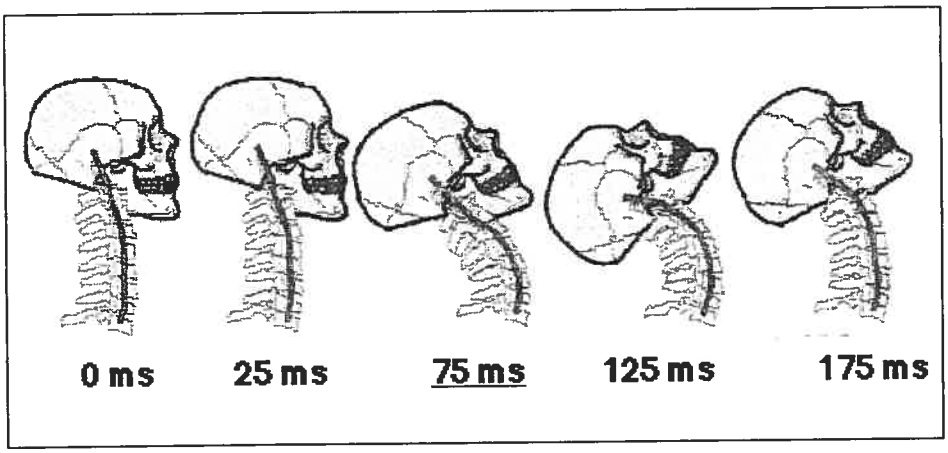
Most of the literature is focused on rear-end collisions as one of the principal causes of WAD. In 1998, Panjabi et al. (67) criticized the theory of a plain hyperextension flexion injury (Figure 1) and proposed a new model to explain the injury mechanism (Figure 2), which has been confirmed by recent studies (68-71).

Figure 1. Illustration of the Two Phases of the Hyperextension Flexion Injury (72)



Phase 1 Phase 2

Figure 2. Illustration of the S-shaped Curve Injury Mechanism (67).



According to the authors' findings the response of the cervical spine to the whiplash trauma is composed of two phases. In the first phase (50-75ms after the impact), the spine forms an S-shaped curve with flexion in the upper cervical levels and hyper-extension in the lower levels. In the second phase (starting at 100-125ms), all levels of the cervical spine are extended but within the physiological limits. Ivancic and Panjabi (71) quantified intervertebral motions during simulated rear impacts and completed the mechanism proposed by Panjabi. They found out that at 5G impacts, the first loads to occur at the level head - C3 caused a combined movement of flexion and rotation. In the subsequent phase the experienced loads caused intervertebral extension rotation and translation of posterior shear and axial separation, followed by axial compression. The loads experienced at C3-6 caused extension rotation and posterior shear translation at C3-4 and extension rotation at C6-7.

2.4 Consequences of Whiplash Injury

Evidence suggests that following a whiplash injury, lesions may be present in any cervical structure including bony elements, intervertebral discs, ligaments, muscles, nerve tissues, zygapophysial and temporomandibular joints (9;12;73-77). Moreover, the similarities found between the symptomatology of whiplash and concussion suggest a similar underlying mechanism of mild traumatic brain injury (78). These lesions generate a multitude of symptoms including pain in muscles and bony structures in the cervical region (79-82), headache (79-82), neck stiffness (79;82), decreased range of motion (ROM) (79;83-88), dizziness/vertigo

(79;81;82;89;90), arm pain (9;79;81;82), and low back pain (91). There is evidence for decreased strength and endurance of neck flexors, decreased strength of the extensor muscles (83), and altered patterns of muscle recruitment of the cervical spine and upper shoulder girdle muscles (85;92-96). Changes in the sensory system are also present. Hypersensitive responses were found both in the cervical spine and remote to the site of injury (97-101). Persons with WAD demonstrate mechanical hyperalgesia (decreased pressure pain thresholds), warm and cold hyperalgesia (102), impaired proprioreception (103-106) and altered peripheral vasoconstrictor responses (85). Other common complaints following whiplash are visual, oculomotor, and auditory disturbances, and temporomandibular dysfunction (79;81;82;107). Cognitive problems and psychological disturbances are also found: memory (82), concentration (108), and sleeping problems (82), psychological distress (109-111), post-traumatic stress disorder (112), and elevated fears of movement and reinjury (85;111) are common symptoms following whiplash injury.

Patients in the chronic stage develop disc (113) and muscle (114) degeneration. They demonstrate as well sensory disturbance symptoms (115-117), eye motility dysfunction (107;118-120), dizziness and vertigo (89;104), and deteriorated sleep quality (121). Chronic WAD is also associated with affective disturbances such as: psychological distress (109;122;123), anxiety, and behavioural abnormalities (124-129). This results in problems in social functioning, daily activities, and a decrease in satisfaction with life (130;131).

2.5 Classifications of WAD

There are several systems of classification of WAD. In 1992, Radanov, Dvorak and Valach (132) proposed a classification based on subjective complaints and testing of self-limited cognitive impairments, divided attention, and speed of information processing. Their classification included two categories: lower cervical spine syndrome (characterized by cervical and cervicobrachial pain) and cervicoencephalic syndrome (characterized by headache, fatigue, dizziness, poor concentration, etc.). In 1998, Gerdle and co-workers (21;133) established a classification which includes four categories of WAD corresponding to the affected anatomical structures and the presented symptoms. In their Scientific Monograph on WAD published in 1995 (1), the Quebec Task Force (QTF) proposed a classification which is still widely used in clinical practice and serves as a reference in many studies on whiplash. This model is used by the Société d'Assurance Automobile du Québec and the PEDIP program and will also be used for this study's inclusion and exclusion criteria. The classification (Table 1) includes five grades that correspond to the severity of the injury and its symptoms (1).

Table 1. Quebec Task Force Classification of WAD (1)

Grade	Clinical presentation
0	No complaint about the neck; No physical sign(s)
I	Neck complaint of pain, stiffness, or tenderness only; No physical sign(s)
II	Neck complaint and musculoskeletal signs (decreased range of motion (ROM) and point tenderness)
III	Neck complaint and neurological signs (Neurological signs include decreased or absent deep tendon reflexes, weakness and sensory deficits)
IV	Neck complaint and fracture or dislocation

Several symptoms and disorders such as, deafness, dizziness, tinnitus, headache, memory loss, dysphagia, and temporomandibular joint pain, may manifest in any grade. The authors have also suggested footnotes to clarify the classification of Grades I, II, and III, and simplify its use by clinicians. However, the QTF classification has been criticized. Tenenbaum et al. (134) proposed an extension to it, based on the site of functional impairment and disability. Their classification added some neuropsychological aspects such as attention, memory, stress-sensibility and irritability. In 2004 Sterling et al. (85) criticized the fact that the QTF classification is primarily based on the severity of signs and symptoms following injury and proposed a new classification that takes into account measurable disturbances in motor, sensory and psychological dysfunction. The authors found that the WAD II grade of the QTF classification was too narrow and included three distinct WAD II grades in their classification system. Soederlund and Denison (135) developed a classification for patients with chronic WAD based on self-reported Multidimensional Pain Inventory scores. The authors stressed the importance of psychosocial and behavioral factors for patients with chronic pain and suggested that their classification can be used as a complement to one based on the medical condition.

2.6 Treatment and Rehabilitation of Chronic WAD

The evidence on chronic WAD treatments is often contradictory or inconvincing (21). However there are indications that some interventions result in pain reduction.

Two randomised, double-blind trials concluded that percutaneous radio-frequency neurotomy (RFN) of the facet innervation of the zygapophyseal joints relieves pain and psychological distress in patients with chronic WAD (136;137). The patients of one of those studies (136) were followed for several years. Seventy-one percent of them reported complete pain relief for a median duration of 422 days (138). In a comparative study with a pre and post design, Prushansky et al. (139) assessed the effect of RFN on multiple outcomes including: self-perceived disability and improvement, cervical ROM, isometric cervical muscle strength, cervical pressure pain threshold and patients' psychological health. RFN had a significantly positive effect on all measured subjective and objective outcomes.

The results of a randomized, placebo controlled trial (140) showed significant improvement in the visual analogue scale (VAS) score of patients with chronic WAD treated with Botulinum toxin. The patients continued to demonstrate significant pain reduction and improved ROM at two and three months, but not at four months (141).

In a randomized controlled trial, Lemming et al. (142) investigated the efficacy of a combination of low-dose remifentanil and ketamine compared to the single drugs and placebo. The combination showed a significant analgesic effect on pain measured by VAS. However the response of the patients wasn't uniform. A large group of the patients (33%) experienced a pain relief of less than 50%.

The available literature on the efficacy of conservative treatments in patients with chronic WAD has been investigated in two systematic reviews and it was concluded that active treatments might be more effective (123;143). However there is some evidence that passive treatments may also be beneficial. In a case report (144) a chronic WAD patient was treated conservatively with mirror-image cervical spine adjustments, exercise, and traction to reduce forward head posture and cervical kyphosis and experienced improvement in symptoms and function.

Numerous investigated treatments were revealed to be ineffective. The effect of intra-articular corticosteroid injection into the cervical zygoapophysial joints was studied in a randomized controlled trial, but was found to be no more effective than a local anesthetic (145). A recent randomized controlled trial investigated the effect of specific therapeutic jaw exercises on the temporomandibular disorders of patients with chronic WAD (146). The exercises, in addition to the regular whiplash rehabilitation program, did not reduce symptoms and signs of temporomandibular disorders. The effectiveness of intravenous injections of morphine, lidocaine, and ketamine on duration of chronic pain after

whiplash trauma was evaluated, but no significant differences in scores of pain intensity (VAS) between the five days before and after testing existed for any of the analgesics (147). The effect of an alternative quality of life intervention was explored by Ventegodt et al. (148), but the combination of gestalt psychotherapy and body therapy (Rosen therapy and Cranio Sacral therapy) had no effect on patients with chronic WAD. Other therapies such as pulsed electromagnetic treatment, subcutaneous sterile water injection, acupuncture, and wearing a magnetic necklace were identified by the Quebec Task Force monograph on WAD (1). Only the subcutaneous sterile water injection showed a small positive effect and although further studies were recommended we found no new evidence on its effectiveness.

2.6.1 Multidisciplinary Rehabilitation Programs for Subacute and Chronic WAD

Multidisciplinary rehabilitation programs including exercise, occupational, cognitive and behavioral approaches (48-51) have increasing scientific support in subacute and chronic musculoskeletal pain.

There are several studies that suggest that multimodal rehabilitation is effective for patients with subacute WAD and prevents the occurrence of chronic symptoms. In a randomized controlled trial Bunketorp et al. (149) compared patients with subacute WAD who underwent multidisciplinary rehabilitation with a self-administered home training group. They found that the supervised multimodal intervention was significantly more favorable than home training in terms of

improvement in self-efficacy, fear of movement and pain disability at three months. Furthermore, patients in the multimodal treatment group used analgesics less frequently. Sullivan et al. (150) compared subjects who received physical therapy with patients who participated in an intervention combining physical therapy and psychosocial risk reduction. According to their results participation in the psychosocial intervention plus physical therapy resulted in a higher return-to-work rate than participation in physical therapy alone. Suissa et al. (151) evaluated the effectiveness of a multidisciplinary clinical management approach and concluded that it improved the rate of ending of compensation and file closure and significantly reduced the average cost per patient compared to the standard treatment. Provinciali et al. (152) followed patients with subacute whiplash who were randomly allocated to a multi-modal rehabilitation intervention or a control treatment (physical agents only, such as electrical and sonic modalities). Outcomes were pain level, range of movement, self-rating scale of treatment efficacy and return-to-work delay. The multidisciplinary treatment was more beneficial for the patients than the control intervention, despite the fact that the same benefit was obtained in joint mobility in the two groups.

The effectiveness of multimodal rehabilitation for patients with chronic WAD has some support as well. Soderlund et al. (57) evaluated the effectiveness of a model for an integrated physiotherapy-cognitive-behavioral treatment of patients with chronic WAD in three experimental single case studies. They found that physiotherapy integrated with cognitive behavioral components decreased the

patients' pain intensity in problematic daily activities. In a study conducted in the Netherlands, 26 patients with WAD grade I or II with persisting symptoms of longer than six months duration attended a four-week multimodal treatment program (59). The results were promising - the patients had statistically significant reductions in disability, depression, and cognitive complaints. Sixty-five percent of them returned to full time work and 27% to part-time; 81% of the whole group did not use any further treatment after the program was complete. Heikkila et al. (56) evaluated the effect of a multidisciplinary rehabilitation program on a sample of 40 patients with chronic WAD and 33 patients with musculoskeletal pain in the neck or back. A significant increase in physical coping resources occurred during the rehabilitation period whereas a decrease had occurred at the follow-up (two-three years later). However, 46% of the patients reported an increased total life satisfaction at follow-up. The results of this study have to be interpreted with caution, because it contained no control group and the sample was not constituted of patients with whiplash only. In a randomized controlled trial, Stewart et al. (58) compared the effectiveness of advice sessions versus an advice and exercise program for patients with persistent symptoms. The exercise and advice treatment was superior to the advice only program, but the difference was small and was only in the short-term outcomes. The combined treatment was more effective for subjects with higher baseline pain and disability. Sterner et al. (153) followed 90 subjects reporting chronic WAD symptoms who were treated in a five or eight weeks long interdisciplinary rehabilitation program. The primary aim of the program was to increase levels of activity and independence. The analysis revealed an increased

ability to cope with pain, and a decrease in pain intensity at the six months follow-up. However, for most of the functional and psychological markers, no significant changes were found. Cassidy et al. (55) followed a cohort of patients with subacute and chronic WAD with the aim of comparing the effectiveness of group fitness training, outpatient multidisciplinary rehabilitation, individual treatment and inpatient multidisciplinary rehabilitation. The inpatient and outpatient multimodal program did not prove to have any advantages over the usual individual care.

In summary, there is evidence that there are treatments which may be effective for chronic WAD. Percutaneous radio-frequency neurotomy reduces pain, disability and psychological distress and improves cervical ROM and isometric cervical muscle strength (136-139). Its effect is long-lasting but not permanent and repetitions of the procedure are likely (138). Botulinum toxin injections result in significant short-term pain reduction and improved ROM (140;141). The effect of the combination of low-dose remifentanil and ketamine has to be further studied (142). Active treatments might have an advantage over conservative interventions (123;143).

Multidisciplinary rehabilitation programs which combine exercises with behavioral and cognitive treatments seem to be effective for patients with subacute WAD, but the literature doesn't reach full consensus on the significance of their effect for persons in the chronic stage.

2.7 Biopsychosocial Model of Chronic Pain and WAD

According to many researchers cognitive, affective and behavioral factors are related to the perception of pain and disability in patients with chronic pain. A biopsychosocial model of musculoskeletal chronic pain has been proposed and subsequently adopted by the scientific community (47;154-161). It emphasizes the role of psychological and social factors in the development and persistence of chronic symptoms and disabilities. Disability is no longer attributed only to physical characteristics but is also associated with psychological and environmental factors, such as societal beliefs, insurance and compensation systems.

This model has been explored and accepted in the WAD field as well (40;41;162-169). Scientific evidence indicates that WAD is not only a physical problem but is also influenced by psychological factors (39-41), social policy, and by insurance and legal systems (8;41-45), thus suggesting that chronic WAD may be also culturally determined. The information regarding the possibility for chronic pain after whiplash injury is abundant in Western societies. According to Ferrari, this knowledge may produce preconceived expectations regarding the duration of symptoms in WAD and may lead the patient to become hypersensitive and to amplify symptoms (40). This hypothesis was verified in a more recent study (43). The authors compared the nature and duration of expected whiplash symptoms in Germany (a country in which the chronic whiplash syndrome is apparently uncommon) with that in Canada (a country with a high occurrence of chronic WAD). The authors found that Canadians had significantly higher expectations for

chronicity and hypothesized that the lack of expectation of chronic symptoms in Germany may be an etiologic factor for the lower prevalence of late whiplash there. Castro and colleagues (39) exposed subjects to a placebo collision to see how often whiplash symptoms arose in the absence of risk for injury. The placebo collision provoked symptoms in 20% of the subjects suggesting that certain psychological profiles place individuals at higher risk for WAD. Cassidy et al. (8) explored the effect of the change of the compensation system for traffic injuries in Saskatchewan, from one that included payments for pain and suffering, to a no-fault system. The incidence of claims for WAD significantly decreased after the no-fault system was implemented. Studies in countries like Lithuania (44;45) and Greece (66) where litigation is uncommon and information on chronic WAD is scarce confirm these conclusions. In both countries WAD prognosis was very good and chronicity was almost non-existent. Recent research has emphasized the importance of psychosocial factors in the development of chronic WAD. Patients' style of coping with the pain (28;38;170-175), fear of reinjury associated to movement (20), psychological distress (28;34-37;176;177) and life satisfaction (56) seem to play a role in the transition from acute to chronic symptoms. The biopsychosocial model does not imply that the chronic pain and disability are only in the minds of the patients. It suggests that patients' beliefs and expectations, their perception of the symptoms, and how they cope with them will change the character of those symptoms and the patient's behavior (40). Psychosocial factors are not the only cause for chronic WAD, but they play an important role in its development and persistence.

2.8 Factors Associated with the Outcome of WAD

2.8.1 Reviews on WAD Prognosis

In their scientific monograph on WAD (1) the Quebec Task Force (QTF) reviewed the existent literature on factors associated with the prognosis of WAD. They found very limited evidence on determinants for the risk for WAD and its prognosis. Among the factors associated with the onset of this condition were seatbelt utilization, headrest type and the type of collision. Risk factors for chronicity were finger paresthesia, and presence of musculoskeletal or neurological signs within three days of the MVA. No acceptable studies on the prognostic importance of radiological findings were found. Among the socio-demographic factors only older age seemed to be associated with persistent symptoms. The evidence on the association of compensation and legal action with WAD outcome was inconclusive. According to the existent literature one psychological factor predicted longer recuperation and it was self-report of cognitive impairment. The QTF found that the available literature on WAD prognosis was limited and strongly recommended future prognostic research. In order to fill this gap in the literature the QTF followed a large cohort of subjects who were compensated for work disability after a whiplash injury (25). The results revealed that a poorer prognosis was predicted by older age, female gender, having dependents and not working full-time. Several crash-related factors were also associated with a worse outcome – being in a severe collision, in a vehicle other than a car or a taxi, in a collision other than rear-end and not using a seatbelt.

In 2001 Côté et al. (23) published a systematic review of prognostic studies on WAD in an effort to update the review of the QTF. Consistent evidence regarding worse prognosis was found for the following factors: older age, female gender, baseline neck pain and headache intensity, and baseline radicular signs/symptoms. The evidence on the general health before the injury, crash-related factors, and initial health care, legal and compensation factors was deemed to be inconclusive or limited. The authors concluded that high-quality evidence was scarce and recommended prognostic studies with large cohorts.

A more recent review on WAD prognosis, published by Scholten-Peeters et al. (10), revealed that there was strong evidence that high initial pain intensity is an adverse risk factor, while there appeared to be no prognostic value for older age, female gender, high acute psychological response, angular deformity of the neck, rear-end collision and compensation. The evidence for some physical (restricted ROM, low workload in neck muscles, high number of complaints), psychosocial (previous psychological problems), neuropsychological (nervousness), crash related (accident on highway, car stationary when hit rear-end, women passengers) and treatment related factors (need to resume physiotherapy) was limited. A secondary analysis, which included only high quality cohort studies with a sample size of at least 100 patients, indicated that turned head position, and disc degeneration changed from inconclusive evidence into respectively, strong evidence and strong evidence for no prognostic value. High acute psychological response and rear-end collision changed from strong evidence for no prognostic

value into inconclusive evidence. The authors acknowledged that their results weren't similar to those of the review of Côté et al. (23) and attributed these differences to their different search period, methodology, review criteria, outcome measures and their qualitative summary using levels of evidence. Moreover Scholten-Peeters et al. included only prospective cohorts in their review and did not have the English language limitation of the previous two reviews.

Factors associated with the outcome of WAD were the subject of a lot of studies from this last review until now. The results of these studies potentially provide new evidence on WAD prognosis and explain the disparities between the three above cited reviews. They are discussed in the next section.

2.8.2 Factors Associated with Onset of WAD

Several studies dealt with risk factors for the onset of WAD symptoms. The predictive ability of psychosocial and socio-demographic factors was studied by Richter et al. (178). According to the results, the following subscales of the psychosocial measurement tools used in this study were predictive of initial symptom severity: "role physical", "bodily pain", "vitality", "social function" and "role emotional" (Short Form 36); "pain intensity" and "anxiety" (Pain control questionnaire); "avoidance" (Impact of Events Scale); and "everyday life" (Everyday Life Quality Questionnaire). This study presented several problems in terms of its internal validity, notably an insufficient sample size for the number of investigated independent variables. Therefore, its results should be interpreted with

caution. Malik and Lovell (179) hypothesized that the incidence of whiplash after relatively minor MVAs, the unpredictability of the prognosis and the lack of objective evidence of a pathological mechanism suggest that psychosocial variables are important factors in determining the development of neck pain. They investigated the incidence of whiplash in a cohort of 36 patients involved in high-energy vehicular collisions. The authors found a surprisingly low WAD incidence (only 5.5%) and there was no significant association between crash-related and socio-demographic factors, and the onset of symptoms. However, several studies have found that crash-related and socio-demographic factors are associated with prognosis. Among the most frequently cited risk factors are: female sex (3;17;162;180), younger age (3;17;24), previous history of neck pain (3;24), rear-end collision (3;180), and car stationary when hit (3;24). Other factors found to be related to the onset of WAD symptoms include: collision severity, not being at fault, monotonous work (3), being a driver (180), involvement of a lawyer (162), semi-skilled or skilled occupational class and being in a large car (24).

2.8.3 Factors Associated with Chronicity/Persistent Symptoms

Most of the research on WAD prognosis after the publication of the three above mentioned reviews (1;10;23) is focused on factors associated with prolonged disability. Psychosocial factors are the object of many studies.

Several studies explored the predictive ability of the psychological state of the patient. Higher levels of initial psychological distress and early depressive

symptomatology have been associated with persistent neck pain (37;177) and also discriminated between subjects with persistent milder symptoms and those who fully recovered (35). There is evidence that the initial psychological state of the patient is predictive of the occurrence of persistent psychiatric symptoms (181) and that pre-injury depression or anxiety symptoms are associated with long-lasting disability and psychological distress (176). Post-traumatic stress disorder (128), acute emotional stress (35;182), somatization (conversion of a mental state such as depression or anxiety into physical symptoms) (34) and problems with work or other daily activities as a result of emotional problems (183) were also identified as risk factors for worse prognosis. However, not all studies agree that the psychological state of the patient has predictive value. Three studies (31;184;185) found that high baseline levels of psychological distress and depression weren't independently associated with poor recovery and another one (29) concluded that pre-accident psychiatric state of the patients was not a significant predictor of the severity of physical and psychiatric symptoms post-injury.

The patients' style of coping with their pain and disability is often mentioned in the literature as a significant predictor of the outcome of the recovery process. Soderlund et al. (174) found that the importance of the association between self-perceived pain and disability and the following coping styles: catastrophizing, pain behaviors, diverting attention, increased behavioral activity, reintepreting pain sensations (measured by the Coping Strategies Questionnaire), increased over time. The prognostic value of the catastrophizing behavior was confirmed by

Sullivan et al (175). Low self-efficacy (optimistic self-beliefs to cope with difficulties) appears to be a risk factor for persistent disability as well (38;171;173). Carroll et al. (172) evaluated the effect on recovery of two coping strategies: passive and active coping. The passive coping strategy was found to be a significant risk factor for poor prognosis. Buitenhuis et al. (170) found that the coping style played a role during the first few weeks of the development of chronic symptoms. According to their results lower score for seeking social support and a higher score for the palliative reaction coping style (Utrecht Coping List) predicted longer duration of neck complaints. Not all studies concluded that coping strategies predict the outcome of WAD. In a one-year prospective study Kivioja et al. (186) found that the coping strategies used by the patients weren't predictive of persistent pain.

Fear of movement is another psychosocial factor which may have a role in WAD prognosis. Nederhand et al. (20) found that while initial self-perceived disability and pain intensity predicted Neck Disability Index (NDI) score at 24 weeks after injury in their study, fear of movement (Tampa Scale for Kinesiophobia) increased the predictive value of their model. However, three other studies (35;171;187) did not corroborate these findings.

Personality traits and symptom expectations have also been researched. Pettersson et al. (188) explored the relationship between personality traits and WAD chronicity but found no significant correlation at the two year follow-up. Ferrari et al. (43) compared the nature and duration of expected WAD symptoms

in Germany (a country in which the chronic whiplash syndrome is apparently uncommon) with that in Canada (a country with a high occurrence of chronic WAD). The authors found that Canadians had significantly higher expectations for WAD chronicity than Germans and hypothesized that the lack of expectation of chronic symptoms in Germany may account for the lower prevalence of chronic WAD there. The effect of patients' expectations on their recovery was investigated in a descriptive analysis of 24 patients with WAD (189). Four of the participants had negative expectations and all of them had symptoms after one year. In two other cases, the daily life activity stress was judged to have influenced the negative outcome. The authors acknowledged the limitations of their study (descriptive analysis, small sample size) but nevertheless concluded that psychosocial factors play an important role in WAD prognosis.

Risk factors other than psychosocial have also been explored in the WAD field. The most consistently mentioned predictors of chronicity are high initial pain and disability level (20;24;31;34;35;37;38;128;177;182;185;190), and older age (25;29;35;173;182;190). There is evidence that among the socio-demographic factors female gender (25;33;34;170;181;190;191) and lower education (4;33;34;184;191) are also associated with worse prognosis. However, the conclusions in the literature about the latter two are not always consistent. The role of work status (professional class and pre-accident employment status) is unclear, but there is evidence, that it might have prognostic value (4;24).

2.8.4 Factors Associated with Return to Work or Duration of Sick Leave

The association between prognostic factors and return to work in patients with WAD has been also researched. Gozzard et al. (192) conducted a review of 586 medico-legal reports of employed patients who had sustained a whiplash injury and found that increasing severity of disability, employed (rather than self-employed) status, heavy manual occupation and a previous history of psychological disease are factors associated with greater time off work after a whiplash injury. The presence of neurological symptoms or signs and WAD grade predicted slower return to full activity. Sullivan et al. (150) explored factors associated with return to work in patients with WAD attending a psychosocial intervention program combined with physical therapy. They found that only a shorter duration of work absence and greater reductions in pain catastrophizing during the treatment predicted return to work.

Several of the studies on predictors of chronicity, that were cited in the previous section, investigated possible risk factors for prolonged work disability and predictors of return to work. Hendriks et al. (34) identified the following variables as risk factors for a combined outcome of work disability and pain severity: higher baseline neck pain intensity, higher somatisation and sleep difficulties, lower baseline VAS scores for work-related activities, female gender, being unprepared for collision, and low education. Gun et al. (183) reported that the bodily pain score and role emotional scores of the Short Form-36 health questionnaire showed a consistent significant positive association with return to work at the one-year follow-

up. Miettinen et al. (184) found that females and married, divorced or widowed persons as opposed to those who were single stayed off work longer.

Studies on injured workers with subacute or chronic musculoskeletal complaints including neck and low back pain confirm the prognostic value of individual and environmental psychosocial factors. Some of the most cited psychosocial factors associated with return to work are: expectations of the patients regarding their recuperation and return to work (193-201), social support at work (199;200;202-205), level of psychological distress (199;201;204;206;207), occupation type and demands (199;202;208), job satisfaction (209;210), fear-avoidance beliefs (211), patient's motivation (212) and coping behaviour (201;205). Among the physical risk factors, high level of pain and disability is consistently identified as a significant predictor of late return to occupational activity (47;194;198;199;211).

2.8.5 Factors Associated with Disability or Recovery of Patients with Chronic WAD

The majority of the studies on WAD prognosis are focused on identifying factors and characteristics of the patient measured during the acute phase that predict delayed recovery and chronicity. Only three studies explored associations between predictors and outcomes in patients in the chronic phase.

In a descriptive study Peolsson and Gerdle (28) investigated the correlation between quality of life (QOL) and background variables, symptoms, and coping

styles in patients with chronic WAD. Higher depression, catastrophization, and a higher number of symptoms were the most strongly associated with lower QOL. The coping styles "pain decrease" and "pain control" were also associated with outcome, but they were of weaker importance.

To date, only two studies have explored factors associated with outcome in persons with chronic WAD treated in a multidisciplinary environment. Heikkila et al. found that the elapse of time since working, low life satisfaction, lack of increase in coping resources during the rehabilitation program, ethnic origin other than that of the majority and living in a rural area predicted delay in return to work or training two years after the start of the rehabilitation program (56). However, the subjects in this study were not only patients with WAD (55% of the sample) but also patients with musculoskeletal pain in the neck or back. Moreover, only two psychosocial factors were investigated as potential predictors – coping with the pain and life satisfaction and the outcome was return to work or school with no attention paid by the authors to the level of pain and disability. Stewart et al. discovered that higher baseline levels of pain and disability were associated with greater treatment effects on pain intensity in patients undergoing treatment in a program combining exercise and behavioral treatment (58). However, they did not consider psychosocial factors other than fear of movement.

2.8.6 Summary

Important knowledge on the significance of psychosocial and socio-demographic factors has been gained since the reviews on WAD prognosis by Spitzer at al. (1), Côté et al. (23) and Scholten-Peeters et al. (10). In concordance with the conclusions of the latter two, high initial self-perceived pain and disability were consistently identified in more recent studies as a risk factor for chronicity. There is also good evidence that older age (3, 16, 25-27, 29, 32, 34, 35, 173) and female gender (3, 16, 25-27, 32-34, 173) significantly predict persistent symptoms. Several psychosocial factors were also found to be associated with prognosis. These were coping styles (28;38;170-175), psychological distress (28;34-37;176;177), fear of movement (20), and life satisfaction (56). Among the socio-demographic factors lower education (4, 33, 34, 184) has been frequently associated with worse prognosis. The role of work status (professional class and pre-accident employment status) is yet to be determined, but there is evidence, that it might have prognostic value (4, 24, 25).

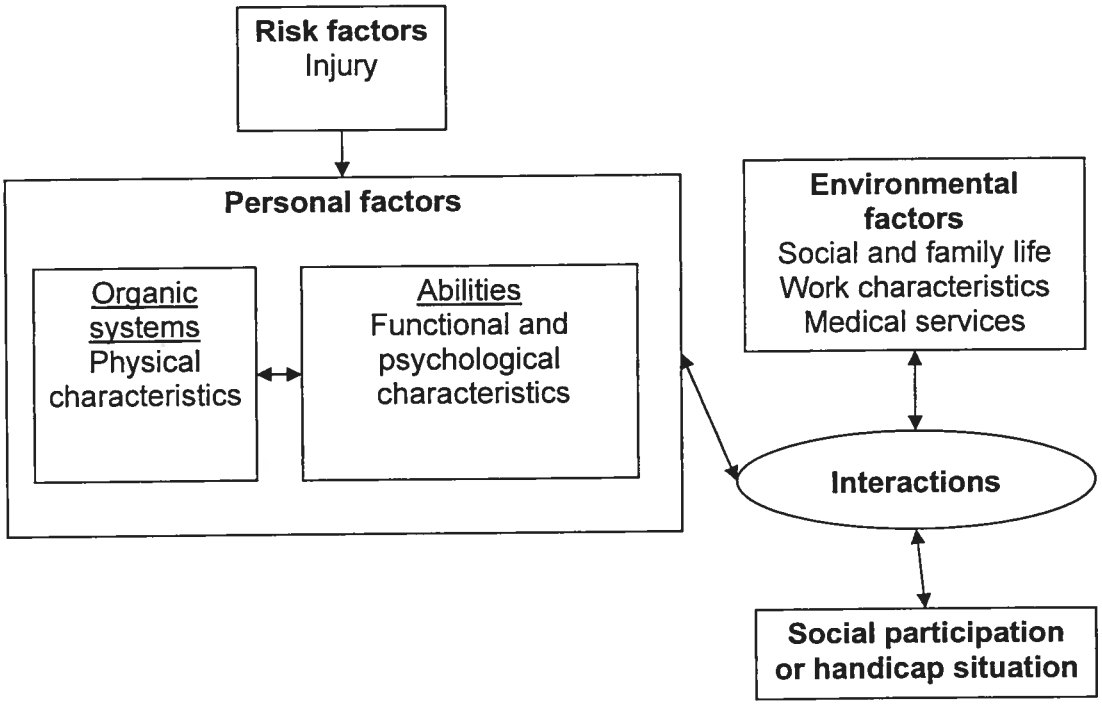
Research on the predictors of return to work in patients with WAD is limited but evidence from studies of workers with subacute or chronic musculoskeletal complaints suggests that the expectations of the patients regarding their recuperation and return to work (193-201), social support at work (199;200;202-205), level of psychological distress (199;201;204;206;207), occupation type and demands (199;202;208), job satisfaction (209;210), fear-avoidance beliefs (211) and coping behaviour (201;205) influence the duration of work absence.

The evidence on prognostic factors for the recovery of patients with chronic WAD who undergo multidisciplinary rehabilitation is scarce and the need for further research in this field is evident.

2.8.7 Theoretical Framework

The multidimensional nature of the factors that influence WAD prognosis is illustrated using the Disability Creation Process (Figure 3). The Disability Creation Process model explains the causes and consequences of diseases, trauma, or other threats to one's integrity (213). It consists of four components: risk factors (causes), personal factors (organic systems and abilities), environmental factors (facilitators and obstacles), and situations of social participation or handicap. In our case the injury (risk factor) provokes the traumatic event that causes impairment to the person's organic systems, creating potential functional and psychological disabilities. The sustained impairment and disabilities influence and are influenced by the patient's environment (social and family life, medical and rehabilitation services). The interaction between the personal and environmental factors creates situations of social participation or handicap. In this study we seek to identify the socio-demographic, functional, psychological factors (personal factors) and work characteristics (environmental factors) that are associated with outcomes of the rehabilitation program, in terms of: level of pain and disability (functional abilities/disabilities), level of psychological distress (psychological abilities/disabilities) and return to work (social participation/handicap situation).

Figure 3. **Multidimensional Nature of Factors that Influence WAD Prognosis (Adapted from the Disability Creation Process)** (213)



CHAPTER 3

METHODOLOGY

3.1 Study Sample

Patients with chronic WAD from the Evaluation, Development and Professional Reintegration Program (PEDIP) of the Jewish Rehabilitation Hospital in Laval were recruited to participate in this prospective cohort study. One of the principal treatment programs offered by PEDIP is the multidisciplinary Personalized Care Program for Sprains and Muscular Injuries (PSP). PSP is conceptually based on the Disability Creation Process (213) and Mayer's Functional Restoration Intervention (248). The main goal of PSP is the return to usual everyday activities including work. The treatment is intensive and lasts about seven weeks, five and a half hours per day, five days a week. For patients who were employed, gradual return to work before the end of the program is encouraged. The treatment is individualized, as the goals are centered on the needs and habits of the patient. The program includes a cognitive-behavioral component (behavioral therapy and psychological support), an ecological component (an occupational therapist visits the work place of the patient and a kinesiologist may direct the patient to a community-based fitness program), a functional component, and a combination of work hardening and conditioning. Patients are treated by a multidisciplinary clinical team, composed of a doctor, a psychologist, a physiotherapist, an occupational therapist, and a kinesiologist. The team uses an interdisciplinary approach in their

work with the patients: the health professionals in the team have a common goal in the treatment of the injured person and establish a common treatment plan by regularly communicating with each other.

Ethics approval was obtained from the Centre de Recherche Interdisciplinaire en Réadaptation (CRIR) (Appendix A) and all subjects signed an informed consent form prior to participating (Appendix B). In order to be eligible for the study, the patients had to fit the criteria detailed below.

3.2 Inclusion and Exclusion Criteria

Inclusion criteria

1. 18-65 years of age.
2. Undergoing treatment in PSP.
3. Diagnosed with WAD by a doctor at least 12 weeks prior to their entrance into the program. We chose the 12 week period because the Société d'Assurance Automobile du Québec (SAAQ) uses it as a definition of chronic WAD.
4. Being employed at the time of the injury.
5. Speak and understand English or French.
6. Signed an informed consent form.

Exclusion criteria

1. Diagnosed with WAD grade IV in the Quebec Task Force (QTF) classification (fracture or dislocation).

2. Any concurrent pathology in the cervical region.
3. Having a previous history of WAD.

3.3 Recruitment of Patients

Potential subjects were first contacted by the PSP clinical coordinator upon their entry in the program. The coordinator explained the project's pertinence and objectives, and asked them whether they would agree to participate. The names of those who consented were given to a research team member who met the potential subjects and explained to them the nature of the project in greater detail. Those who consented were interviewed by a research assistant within the first five days of commencing their treatment in the personalized care program.

3.4 Data Collection

Data was collected at entry into PSP (T0), at the end of the treatment program (T1) and three months following end of treatment (T2). At each time point participants completed a series of questionnaires. The same interviewer (PB, a physiotherapist and a graduate student) conducted all the interviews. The interviews are described in detail in the next sections.

3.4.1 Baseline (T0)

The baseline interview (a face to face interview) was conducted in the research center of the Jewish Rehabilitation Hospital. It consisted of seven questionnaires that were being completed consecutively. The first questionnaire

(Appendix C) was developed specifically for this study and addressed basic demographic information (age, gender, ethnicity, marital status, level of education, occupation, date of the accident, whether respondents expected that the PSP rehabilitation program will help them to return to work and details about the accident e.g. whose fault it was according to them and according to their insurance company. The rest of the interview was comprised of the following validated questionnaires: the Neck Disability Index (NDI) (self-perceived disability) (Appendix D), the General Health Questionnaire (GHQ) (psychological distress) (Appendix E), the Tampa Scale for Kinesiophobia (TSK) (fear from reinjury associated to movement) (Appendix F), the Coping Strategies Questionnaire (CSQ) (pain coping strategies) (Appendix G), the Satisfaction with Life Scale (SWLS) (satisfaction with life) (Appendix H), and the Job Content Questionnaire (JCQ) (subscale on social support at work) (Appendix I).

3.4.2 First Follow-Up Interview (T1)

The T1 interview (a face to face interview) was conducted at the end of the seven week PSP treatment program in the research center of the Jewish Rehabilitation Hospital. It included three questionnaires: 1) a questionnaire addressing return to work and details on subjects' occupation (if it changed) (Appendix J); 2) the NDI and 3) the GHQ.

3.4.3 Second Follow-Up Interview (T2)

The second follow-up interview was conducted by telephone three months after T1. The choice of the time interval between the follow-up interviews was based on the fact that we wanted to explore whether any changes in outcomes at T1 would have a lasting effect. This time interval was also based on the opinion of the PSP clinical team. The T2 interview included a questionnaire on return to work (Appendix K), the NDI and the GHQ.

3.5 Measurement Tools

The measurement tools that were chosen had to satisfy the following criteria: 1) they had to have validated and reliable versions in English and French, 2) the instruments that measured outcomes (NDI and GHQ) had to be responsive. Additionally, we preferred tools which had been used in previous studies of patients with WAD.

3.5.1 Questions on Demographic Characteristics, Patients' Expectations, Patients' Perception of Guilt (T0) and Return to Work (T1 and T2)

The baseline demographic questionnaire consisted of 16 items and was developed specifically for this study on the basis of the opinions of the PSP clinical team, the researchers involved in this project and the available evidence on WAD prognosis in the literature. It included basic information on demographic variables, such as age, sex, education, ethnicity, marital status and work status (number of hours worked per week, occupation, and a description of the patient's job). The

open-ended question regarding job description was included in order to achieve a better understanding of the nature of the patient's work. We also asked patients about their expectations regarding return to work since it may correlate with outcome (189;193-201). In order to measure expectations we asked: "Do you expect that the PSP rehabilitation program will help you to return to work and keep your job?" Information on the accident was also recorded. The patients had to indicate the date of the accident and whether they were driving or were passengers. We also assessed the patient's perception of blame and whether this perception was consistent with the authorities'. Ferrari and Russell (214) stipulated that according to their clinical practice almost all of the patients presenting WAD symptoms were not-at-fault for the collision regardless of the type of collision (rear-end, frontal or side-impact). Interestingly drivers at fault for the impact very seldom presented with symptoms. The authors hypothesized that blame is a factor in WAD prognosis. This conclusion was confirmed by Wiles and colleagues (3). The question asked on blame in our questionnaire was: "According to you whose fault was the accident?". We also verified whether patients agreed with their insurance company: "According to your insurance company whose fault was the accident?"

The T1 follow-up questionnaire recorded data on return to work. It consisted of ten items. Questions relating to the date of return-to-work and the type of work the patient returned to were asked. The patients had to specify whether they returned to their former place of work and whether they would have the same duties as before their injury. We also included an open-ended question for those

who changed their job or duties, in which they described their new occupation. We wanted to verify whether the patients returned to their pre-injury work schedule and we asked them to give us information on the hours they work per week. Those who did not return to work were asked to specify whether it was because of their condition or not.

The questionnaire for the T2 interview was divided in two parts - one for those who had returned to work at T1 and one for those who did not. We asked the subjects who had resumed their work related activities after the end of PSP whether they kept their job, found a new one, or weren't working. Those who found a new job were asked to describe their new occupation and all of the patients who were working gave us information on the hours they worked per week. The questions for those who did not return to work at T1 were identical to those asked in the first follow-up interview.

3.5.2 Self-perceived Pain and Disability (Neck Disability Index)

Self-perceived pain and disability have been consistently identified in the literature as a factor which affects WAD prognosis (20;31;34;35;37;38). Several tools measuring self perceived disability related to pain in the cervical region are available presently in French and English versions: the Neck Disability Index (NDI), the Neck Pain and Disability Scale and the Northwick Park Neck Pain Questionnaire. All of these measurement tools have very good and comparable psychometric properties. We used the NDI in this study because, in contrast to the

other two scales, it is widely used in studies on WAD prognosis and its predictive ability has been consistently demonstrated (31;35;37;182).

The NDI is composed of ten items which evaluate functional activities like personal care, lifting, reading, work, driving and sleeping, as well as headache intensity, concentration and cervical pain intensity. The construct validity (215;216) and test-retest reliability (ICC=0.94) (217) of the English version of the NDI are well established. It also has excellent responsiveness with effect sizes ranging from 0.8 to 0.88 (218). The psychometric properties of the French version are also well documented – the instrument has very good construct validity and excellent test-retest reliability (ICC=0.93) (219). The responsiveness of this version was moderate (ES=0.55, SRM=0.55), but it was among the most responsive ones available (220).

The NDI uses a six-point Likert scale that ranges from 0 (no disability) to 5 (complete disability). The final score is obtained by adding the points of all the items. The total score ranges from 0 to 50. The authors provide scoring intervals for interpretation, as follows: 0 – 4 = no disability; 5 - 14 = mild; 15 - 24 = moderate; 25 - 34 = severe; above 34 = complete (215). The scores of the NDI at the two follow-up interviews (T1 and T2) are the principal outcome in this study.

3.5.3 Psychological Distress (General Health Questionnaire)

Psychological distress predicts poorer outcome in patients with WAD (28;34-37;176;177). It has also been shown to be a risk factor for delayed return to work among workers with chronic musculoskeletal complaints (199;201;204;206;207). It will not only be used as a possible predictor of disability but also as a secondary outcome in our study. We explored whether psychological factors affect disability and also whether disability has an effect on the psychological aspects of the patients' health. Psychological distress is assessed with the 12-item General Health Questionnaire (GHQ). The GHQ is a widely-used self-administered screening test, specifically designed to identify short-term changes in psychological distress. The subjects respond to how they have been feeling over the past few weeks. The scale asks whether the respondent has experienced a particular symptom or behavior.

The GHQ has four different versions: the GHQ-12, the GHQ-28, the GHQ-30 and the GHQ-60. The GHQ-12 is very quick to administer and score as it contains only 12 questions. Despite the small number of items, the GHQ-12 was shown to be reliable (test-retest ICC=0.72) (221), (test-retest ICC=0.39-0.79) (222), responsive (ES 0.87, SRM 0.94) (223), to have very good construct validity, and has been extensively used in English and French to measure psychological distress (221;222;224;225).

Each item is rated on a four-point scale (0-1-2-3). The individual scores are summed to produce a total score from 0 to 36. Higher scores indicate higher psychological distress. A cut-off point is also available – scores >12 represent evidence of psychological distress (224).

3.5.4 Fear of Movement (Tampa Scale for Kinesiophobia)

Fear of movement is associated with poorer outcome in chronic back pain (226) and there is evidence that it may have prognostic value in chronic WAD as well (20). We chose the Tampa Scale for Kinesiophobia (TSK) for the evaluation of pain-related fear of movement since it is a well accepted instrument and has been already used in studies on WAD prognosis (20;35;58;171;187).

The TSK (227) consists of 17 items and has good construct validity, test-retest reliability (test-retest r=0.78) and internal consistency (Cronbach's alpha 0.71) in English (228) and French (229).

The TSK employs a four-point Likert scale that ranges from 1 (strongly disagree) to 4 (strongly agree). The scores for items 4, 8, 12, and 16 are inversed and a total is calculated by adding all the individual scores. A higher total score indicates elevated levels of fear of movement.

3.5.5 Coping Strategies (Coping Strategies Questionnaire)

The styles used by the patient to cope with his pain are associated with the outcome in patients with WAD (28;38;170-175).

The catastrophizing coping style has been frequently identified as a risk factor for prolonged disability (28;174;175). The Coping Strategies Questionnaire (CSQ) is used in this study for several reasons – it has very good psychometric properties, includes a subscale on catastrophizing behavior and has been predictive of the recovery in patients with acute and chronic WAD (28;174).

The CSQ is reliable (test-retest r=0.88-0.95) (230), internally consistent (alpha coefficients 0.74-0.87) (230;231) and its construct validity has been documented in English (232) and French (233). The original tool was composed of 48 items, however a factor structure analysis with a sample of patients with chronic WAD (234) revealed the existence of five factors (Distraction, Catastrophizing, Re-interpreting Pain Sensations, Ignoring Pain Sensations, and Prayer and Hoping) and 21 items were retained for the final version.

Each item is rated on a seven-point ordinal scale (0=never do that, 3=sometimes do that, 6=always do that). A score is generated by calculating a mean of the individual answers for each subscale. Higher scores for each subscale indicate greater utilization of the coping strategy.

3.5.6 Satisfaction with Life (Satisfaction with Life Scale)

Satisfaction with life affects the return to work of patients with chronic WAD who are treated in a multidisciplinary environment (56). We evaluated this variable with the Satisfaction with Life Scale (SWLS) which is a very short and easy to administer instrument.

The SWLS (235) is composed of five questions. Its construct validity and reliability have been demonstrated for its English (test-retest r=0.82-0.84) (235;236) and French-Canadian versions (test-retest r=0.64; Cronbach's Alphas from 0.79 to 0.84) (237).

There are seven possible answers to each question, ranging from 1 point (strongly disagree) to 7 points (strongly agree). The points attributed to each item are added and the final score is interpreted by a seven-category grid, proposed by the author (5-9 points: extremely dissatisfied with life; 10-14 dissatisfied; 15-19 slightly dissatisfied; 20 neutral; 21-25 slightly satisfied; 26-30 satisfied; 31-35 extremely satisfied).

3.5.7 Social Support at Work (Social Support Subscale of the Job Content Questionnaire)

Job satisfaction and relationship with employer and coworkers are factors affecting return to work (199;200;202-205) and related with the onset of neck pain (238).

We used the Social Support subscale of the Job Content Questionnaire (JCQ) (239), to measure self-perception of supervisor and co-worker support at work.

The JCQ is reliable (test-retest ICCs of more than 0.9 for all the subscales of the questionnaire) (240) and has a well-established construct validity in English (241) and French (242).

In the present study the Social Support subscale was used. It includes four items on supervisor support and four items on co-worker support and uses a four-point Likert scale, where scores for each question range from one (strongly disagree) to four (strongly agree). The ratings for the eight items are summed to produce a composite score, ranging from eight to a maximum of 24 with higher scores representing greater social support at work.

3.6 Statistical Analyses

3.6.1 Dependent Variables

We assessed the effect of the potential predictors on three outcomes. The main outcome measure was self-perceived pain and disability assessed by the score of the NDI (at T1: short-term post-rehabilitation and at T2: three months post completion of the rehabilitation program). Secondary outcomes at T1 and T2 were: psychological distress (GHQ score) and return to work (dichotomized, i.e. returned to work or not).

3.6.2 Independent Variables

The socio-demographic factors, the initial total or subscale scores of the psychosocial measurement tools and the initial NDI score represented the independent variables. We considered baseline self-perceived neck pain and disability (NDI), seven potential socio-demographic predictors: age, sex, ethnicity, marital status, work status, education and being a driver or a passenger during the motor vehicle accident, and twelve psychosocial factors measured at baseline: psychological distress (GHQ), five pain coping styles (mean subscale scores of the CSQ), fear of movement (TSK), satisfaction with life (SWLS), social support at work (JCQ), patients' expectations regarding their return to work, their self-perception of blame and agreement with the authorities on this same matter.

3.6.3 Statistical Methods

We described basic socio-demographic characteristics of the sample, mean self-perceived disability (NDI) and psychological distress (GHQ) scores. Paired t-tests were used to evaluate whether patients improved after rehabilitation in terms of disability and psychological distress. Return to work rates were documented for both follow-ups (T1 and T2).

The effect of each of the independent variables on the three outcomes was first evaluated by simple linear or logistic regressions, and then subsequently by multivariable analysis. The variables that were significant for a particular outcome at a level of $p<0.1$ in the univariate analysis were then analyzed for collinearity: if

some correlated at a level of r>0.7 (r=Pearson correlation coefficient) only one was kept for the multiple regression analysis, based on evidence from the literature. The selected variables were subsequently entered in a backward multiple regression analysis (linear or logistic, as needed) and the significant variables were identified. A prediction model was created for each one of the three outcomes. This procedure was conducted for both follow-ups (T1 and T2).

CHAPTER 4

MANUSCRIPT

The results of this research project are presented in the following manuscript:

Psychosocial factors associated with outcomes for patients undergoing rehabilitation for chronic whiplash associated disorders: a pilot study

Authors: Petko Baltov, Julie Côté, Manon Truchon, Dorcas Beaton and Debbie Ehrmann-Feldman (To be submitted to the journal Disability and Rehabilitation in May 2007)

The principal author confirms his original contribution to the data collection, statistical analyses and interpretation of the results as well as in the writing of the research articles.

Psychosocial factors associated with outcomes for patients undergoing rehabilitation for chronic whiplash associated disorders: a pilot study

Petko Baltov BSc[1], Julie Côté PhD[2,3], Manon Truchon PhD[4,5], Dorcas Beaton PhD[6,7] and Debbie Ehrmann-Feldman PhD[1,3,8,9]

From the [1]University of Montreal, School of Rehabilitation, [2]McGill University, Department of Kinesiology and Physical Education, [3]Centre for Interdisciplinary Research in Rehabilitation (CRIR), [4]Centre for Interdisciplinary Research in Rehabilitation and Social Integration (CIRRIS), [5]Laval University, Department of Industrial Relations, [6]University of Toronto, Department of Health Policy, Management and Evaluation, [7]St. Michael's Hospital, Mobility Program Clinical Research Unit, [8]Public Health Department of Montreal, and [9]Interdisciplinary Health Research Group (GRIS)

Correspondence and requests for reprints:

Debbie Ehrmann-Feldman PhD

Université de Montréal

C.P. 6128, succursale Centre-ville

Montréal QC H3C 3J7

Tel no. 514 343-6111 #1252

Fax no. 514 343-2105

e-mail: debbie.feldman@umontreal.ca

4.1 Abstract

Purpose. To explore whether psychosocial factors, level of pain and disability and socio-demographic factors, measured pre-treatment, predicted post-treatment disability and two secondary outcomes: psychological distress, and return to work in patients undergoing multidisciplinary rehabilitation for chronic whiplash associated disorders (WAD).

Method. We conducted face to face interviews with 28 patients with chronic WAD at entry to and completion of an intensive rehabilitation program, and a telephone interview three months later. Participants completed self-perceived disability, and psychological distress questionnaires, at baseline and at both follow-ups. They also completed psychosocial questionnaires and provided general socio-demographic information. Return to work rates were documented at both follow-ups.

Results. Higher initial disability predicted higher disability at both follow-ups ($p<0.001$), and higher psychological distress at program completion ($p=0.003$). Younger age ($p=0.028$) and higher initial psychological distress ($p=0.002$) were associated with higher psychological distress three months post-rehabilitation. Greater social support at work was prognostic of return to work at program completion ($p=0.04$).

Conclusions. Baseline disability is the only factor that affected disability post-rehabilitation. Psychosocial factors played a role in the prognosis of psychological distress and return to work. The effect of physical and psychosocial factors on the

recovery of patients undergoing multidisciplinary rehabilitation should be explored in studies with large cohorts.

Keywords: prognosis, risk, neck pain, motor vehicle accident, multidisciplinary, disability, return to work

4.2 Introduction

The current annual incidence of whiplash in Canada is estimated to be more than 100 000 new cases per year [1] and 14-66% of persons suffering from whiplash associated disorders (WAD) develop chronic symptoms [2-4]. Furthermore, 13–50% do not return to work or are unable to perform their usual duties at six months post injury [5,6]. Thus, due to accumulated absence from work and health care costs, people with chronic WAD contribute substantially to the significant economic burden related to this condition.

The biopsychosocial model of musculoskeletal chronic pain has been adopted by researchers in the field of WAD [7-16]. Consistent with this model, chronic WAD is a condition considerably influenced by psychological factors [13,15,17], social policy, and by insurance and legal systems [15,18-22]. Psychosocial factors that may predict chronicity include: the strategies used by the patient to cope with the pain [23-30], fear of reinjury associated with movement [31], psychological distress [27,32-37] and satisfaction with life [38]. Societal beliefs and insurance and legal systems play a role in WAD prognosis as well. Ferrari and Lang found that Canadians had significantly higher expectations of developing chronicity in association with their WAD symptoms, in comparison with Germans [20]. Authors hypothesized that this comparatively low expectation of chronic symptoms in Germany may account for the lower prevalence of chronic WAD there. Cassidy et al. found that the incidence of insurance claims for WAD significantly decreased

after a no-fault automobile insurance system replaced the old system that compensated persons for pain and suffering [18].

Accumulating evidence suggests that multidisciplinary rehabilitation programs are beneficial for patients with chronic WAD [38-42]. At present, there is a lack of studies regarding psychosocial predictors of outcome in persons with chronic WAD who undergo treatment in a multimodal program since research is mainly focused on the predictors of the transition from the acute to the chronic condition. To date, only two studies have explored factors associated with outcome in persons with chronic WAD treated in a multidisciplinary environment. Heikkila et al. found that the elapse of time since working, low life satisfaction, lack of increase in coping resources during the rehabilitation program, ethnic origin other than that of the majority and living in a rural area predicted a poor vocational outcome (defined as return to work or training two years after the start of the rehabilitation program) [38]. The subjects in this study were not only patients with WAD (54.8%) but also patients with musculoskeletal pain in the neck or back. In a randomized controlled trial, Stewart et al. discovered that higher baseline levels of pain and disability were associated with greater treatment effects on pain intensity in patients undergoing a program combining exercise and behavioral treatment [41]. However, they did not consider psychosocial factors other than fear of movement.

The main objective of the current study is to identify psychosocial and socio-demographic factors associated with self perceived pain and disability in patients

with chronic WAD who are treated in a multidisciplinary rehabilitation program. Our secondary objective is to identify psychosocial and socio-demographic factors predictive of post-treatment level of psychological distress and return to work.

4.3 Methodology

4.3.1 Population

Patients with chronic WAD participating in the Evaluation, Development and Professional Reintegration Program (PEDIP) of the Jewish Rehabilitation Hospital in Laval were recruited to participate in this prospective cohort study. PEDIP comprises an intensive multidisciplinary rehabilitation program called Personalized Care Program for Sprains and Muscular Injuries (PSP). PSP lasts about seven weeks and includes treatment by a multidisciplinary clinical team (medical doctors, physical and occupational therapists, psychologists and kinesiologists). The main goal of PSP is the return to usual everyday activities including work. The treatment is individualized, includes a cognitive-behavioral component (behavioral therapy and psychological support), an ecological component (an occupational therapist visits the work place of the patient and a kinesiologist may direct the patient to a community-based fitness program), a functional component, and a combination of work hardening and conditioning. In order to be eligible for the study, the patients had to be: diagnosed with WAD by a doctor at least 12 weeks prior to their entrance into the program (the Quebec Automobile Insurance Board defines chronic WAD as lasting more than 12 weeks), from 18 to 65 years old, being employed at the time of the injury and able to speak and understand English or

French. Excluded were subjects diagnosed with WAD grade IV in the Quebec Task Force (QTF) classification (fracture or dislocation), those who had any concurrent pathology in the cervical region and those who had a previous history of WAD. Ethics approval was obtained from the Centre de Recherche Interdisciplinaire en Réadaptation (CRIR) and all subjects signed an informed consent form prior to participating.

4.3.2 Data Collection

Data were collected at the beginning of treatment T0, at the end of treatment T1 (in face to face interviews) and three months following end of treatment T2 (telephone interview). At each time point participants completed a series of questionnaires.

4.3.3 Interviews and Measurement Tools

The baseline interview consisted of seven questionnaires. The first questionnaire was developed specifically for this study: it addressed basic demographic information (age, gender, etc.), and recorded details about the accident and patients' expectations of return to work. The rest of the interview was comprised of the questionnaires described below. All of them had French and English language versions and documented construct validity and test-retest reliability.

The Neck Disability Index (NDI) [43,44] was used to assess self-perceived pain and disability. The NDI uses a six-point Likert scale that ranges from 0 (no disability) to 5 (complete disability). The final score is obtained by adding the points of all the items. The total score ranges from 0 to 50. The authors provided scoring intervals for interpretation, as follows: 0 – 4 = no disability; 5 - 14 = mild; 15 - 24 = moderate; 25 - 34 = severe; above 34 = complete [43].

Psychological distress was assessed with the 12-item General Health Questionnaire (GHQ-12) [45,46]. Each item is rated on a four-point Likert scale and the individual scores are summed to produce a total score from 0 to 36. Higher scores indicate higher psychological distress. A cut-off point is also available – scores higher than 12 represent evidence of psychological distress [45].

We chose the 17-item Tampa Scale for Kinesiophobia (TSK) [47,48] for the evaluation of pain-related fear of movement. It has a four-point Likert scale that ranges from 1 (strongly disagree) to 4 (strongly agree). The scores for items 4, 8, 12, and 16 are inversed and a total is calculated by adding all the individual scores. A higher score indicates elevated levels of fear of movement.

The Coping Strategies Questionnaire (CSQ) [49,50] evaluates five specific types of coping behavior: Distraction, Catastrophizing, Reinterpreting, Ignoring and Praying. Each item of the questionnaire is rated on a seven-point ordinal scale. A

score is generated by calculating a mean of the individual answers for each subscale.

We evaluated life satisfaction with the 5-item Satisfaction with Life Scale (SWLS) [51,52]. The points attributed to each item are added and the final score is interpreted by a seven-category grid.

The Social Support subscale of the Job Content Questionnaire (JCQ) [53,54] measures self-perception of supervisor and co-worker support at work. The ratings for the eight items of the subscale are summed to produce a composite score, ranging from eight to a maximum of 24 with higher scores representing higher social support at work.

The follow-up interviews (T1 and T2) consisted of the NDI, GHQ and questions regarding return to work.

4.3.4 Statistical Analyses

4.3.4.1 Dependent Variables

The main outcome measure was self-perceived pain and disability assessed by the score of the NDI (at T1: short-term post-rehabilitation and at T2: 3 months post completion of the rehabilitation program). Secondary outcomes at T1 and T2 were: psychological distress (GHQ score) and return to work (dichotomized, i.e. returned to work or not).

4.3.4.2 Independent Variables

Factors potentially associated with outcomes included: baseline neck pain and disability (NDI), seven socio-demographic variables: age, sex, ethnicity, marital status, occupation, education and being a driver or a passenger during the accident, and 12 psychosocial factors measured at baseline: psychological distress (GHQ), five pain coping strategies (CSQ), fear of movement (TSK), satisfaction with life (SWLS), social support at work (JCQ), patients' expectations regarding their return to work, self-perception of blame and agreement with the authorities on this same matter.

4.3.4.3 Statistical Methods

We described basic socio-demographic characteristics of the sample, mean self-perceived disability (NDI) and psychological distress (GHQ-12) scores. Paired t-tests were used to evaluate whether patients improved after rehabilitation in terms of disability and psychological distress. Return to work rates were documented for both follow-ups (T1 and T2). The effect of each of the independent variables on the three outcomes was first evaluated by simple linear or logistic regressions, and then subsequently by multivariable analysis. The variables that were significant for a particular outcome at a level of $p<0.1$ in the univariate analysis were then analyzed for collinearity: if some correlated at a level of $r>0.7$ (r=Pearson correlation coefficient) only one was kept for the multiple regression analysis, based on evidence from the literature. The selected variables were subsequently entered in a backward multiple regression analysis (linear or logistic,

as needed) and the significant variables were identified. A prediction model was created for each one of the three outcomes. This procedure was conducted for both follow-ups (T1 and T2).

4.4 Results

4.4.1 Description of Participants

Twenty-eight patients were recruited over a 1 year period out of a possible 49 who were in the PSP program. Reasons for exclusion were: a history of previous WAD (8 patients), concomitant pathology in the cervical region (6 patients), diagnosis of WAD more recent than 12 weeks (5 patients), and inability to speak or understand English or French (2 patients). Baseline characteristics are described in Table 1. Initially, the patients reported moderate pain and disability (a mean of 22.89 points on the NDI (SD 8.50) and showed evidence of psychological distress (a mean of 16.50 points on the GHQ (SD 6.23).

4.4.2 Follow-Up (T1 and T2)

Three subjects were lost to follow-up at T1, all of them having dropped out of the PSP rehabilitation program at an early point. One of them was afraid of hospitals, the other two didn't give any particular reason. They were older than the other subjects ($p<0.01$), but did not differ from the rest according to number of days since the injury occurred and baseline NDI and GHQ scores. Compared to baseline disability and psychological distress the remaining subjects at T1 ($n=25$) had improved in terms of NDI score ($p<0.001$) but not in terms of GHQ score

(p=0.19). Sixteen patients had returned to work (gradual, part- or full-time), nine had not, but one of them cited reasons unrelated to disability regarding not returning to work.

Two more subjects were lost to follow-up at T2. There were no differences with the rest of the sample (n=23) regarding age, number of days since the injury occurred and baseline NDI and GHQ scores. A significant improvement in NDI ($p<0.001$) and GHQ ($p=0.03$) scores was found when compared to baseline. Fifteen persons were working at T2, eight had not returned to work or kept their jobs, one of them did not return for reasons unrelated to disability (personal choice).

4.4.3 NDI Score

Simple linear regression analyses revealed that three of the potential predictors had an association (at a p-value of less than 0.1) with higher NDI scores at T1: younger age ($p<0.01$), higher score on the CSQ catastrophizing subscale ($p=0.02$) and higher baseline NDI score ($p<0.001$). These were included in a backward multiple linear regression model (Table 2) and the only factor which remained significant was NDI score at baseline ($b=0.79$; $p<0.001$). Age and CSQ catastrophizing were eliminated from the model.

At T2 five potential risk factors were identified in the univariate analyses: younger age ($p<0.01$), CSQ catastrophizing ($p=0.02$), CSQ distraction ($p=0.05$),

single, divorced or widowed status (vs. married or living together) ($p=0.03$), higher baseline GHQ ($p=0.03$) and NDI ($p<0.001$) scores. Because of the strong correlation between baseline GHQ score and CSQ catastrophizing (Pearson $r=0.74$), and the available evidence in the literature [27,29,30], GHQ was excluded from the subsequent multiple regression analysis. For reasons of statistical power, we included only three variables in the multivariable regression model based on evidence in the literature: age, CSQ catastrophizing and initial NDI score [26,27,29,30,32,37,55-59]. Multiple regression revealed that baseline NDI score ($p<0.001$; $b=0.79$) was the only significant prognostic factor of pain and disability (NDI) at T2 (Table 2).

4.4.4 GHQ Score

At the first follow-up, baseline NDI score ($b=0.57$; $p<0.01$), baseline GHQ score ($b=0.51$; $p<0.01$) and CSQ catastrophizing ($b=0.61$; $p=0.001$) met our $p<0.1$ criterion in the simple linear regression analyses for this outcome. The baseline GHQ score was selected for the multiple regression instead of the CSQ catastrophizing score based on evidence in the literature [36,60]. According to the result of the multiple regressions only baseline NDI score ($b=0.57$; $p<0.01$) was independently associated with the GHQ score at T1 (Table 2).

At the second follow-up the potential risk factors identified by the simple regressions were: younger age ($p=0.03$), CSQ catastrophizing ($p<0.01$), CSQ distraction ($p=0.099$), higher baseline psychological distress (GHQ) ($p<0.01$),

higher baseline pain and disability (NDI) ($p<0.01$), and self-perception of fault ($p<0.01$). Based on the literature, we included age, baseline GHQ and baseline NDI scores in the multivariable model [36,60,61]. Age ($p=0.028$; $b=-0.37$) and baseline GHQ score ($p=0.002$; $b=0.56$) remained significant predictors.

4.4.5 Return to Work

At T1 the simple logistic regression analysis revealed that three variables were associated with return to work at a level of $p<0.1$: social support at work ($p=0.04$), occupation ($p=0.09$) and baseline NDI score ($p=0.09$). We kept the baseline disability score instead of occupation for the multivariable analysis basing our decision on the available evidence in the literature [34,62-66]. Only social support at work remained significant ($p=0.04$; OR=1.64, 95%CI (1.02,2.61) using the backward logistic selection procedure.

There were no significant predictors of return to work at T2.

4.5 Discussion

To our knowledge, this is the first study to investigate the effect of a comprehensive set of psychosocial variables on outcomes in a sample of patients with chronic WAD undergoing multimodal treatment. Previous studies involved patients with musculoskeletal pain in either the neck or back [38], or explored the effect of only one psychosocial factor [41]. Our analyses show that baseline neck pain and disability, socio-demographic, and psychosocial factors were associated

with our outcomes. A higher initial NDI score predicted a higher level of neck pain and disability at discharge and follow-up, and a higher level of psychological distress at the three month follow-up interview. Younger age and a higher initial GHQ score were associated with higher levels of psychological distress at T2. More social support at work was prognostic of return to work at discharge.

4.5.1 NDI

Our finding that initial levels of pain and disability predict pain and disability at follow-up is consistent with the conclusions of the reviews on WAD prognosis of Côté et al. [67] and Scholten-Peeters et al. [68]. The baseline NDI score accounted approximately for 63% and 62% of the variation in pain and disability at respectively the end of treatment and three months post-treatment. Although a higher initial NDI score is known to be a predictor of WAD chronicity [32,37,56,57,67,68], our study is the first to indicate that pre-treatment disability in patients with chronic WAD undergoing intensive multidisciplinary rehabilitation predicts post-treatment levels of disability.

Interestingly, younger age (at T1 and T2) was identified as a risk factor in the univariate regression. This is not concordant with the available evidence as most studies identify older age as an adverse prognostic factor [26,37,55,57,58]. However, the effect of younger age became insignificant when controlled for baseline disability and catastrophizing. Thus, the link between young age and an adverse prognosis remains unclear.

Although none of the psychosocial factors were significant in the multiple regression analysis, several factors were associated with neck pain and disability in the univariate analysis. Two coping styles, catastrophizing (at T1 and T2) and distraction (at T1), and higher baseline psychological distress (at T1) were related to a worse outcome. Catastrophizing [27,29,30] and psychological distress [27,32-37] have already been found to influence the prognosis of WAD. However, the distraction coping style has never been identified in the literature as a risk factor for neck pain and disability. It is possible that this coping style has a positive effect on pain in the acute stage of WAD, but not when the pain becomes persistent. Perhaps, patients with chronic WAD treated in multimodal programs need to be aware of their symptoms to a certain extent without catastrophizing, in order to have successful outcomes. Ferrari has stipulated that psychosocial factors such as patients' expectations and perception of the symptoms change the character of the symptoms and patients' behavior [13]. It is possible that psychosocial factors play an important role in the transition from acute WAD to chronic pain and disability, but when the character of those symptoms has already been changed and the patient is in the chronic stage of WAD, psychosocial factors may no longer significantly influence recovery. This is partly supported by the finding of Stewart et al. that fear of movement is not predictive of treatment effects in chronic WAD patients [41]. This hypothesis needs to be validated in subsequent studies with larger samples of patients with chronic WAD undergoing multidisciplinary rehabilitation.

An alternative explanation is that self-perceived pain and disability is a function of such factors as distress [37], catastrophization [29,30], and coping [24,26,28] explaining the nonsignificance of the psychosocial factors in the multivariable model.

4.5.2 GHQ

In this study, we used psychological distress as an outcome in order to shed light on the debate whether psychological factors predict physical outcome or whether pain and disability level influence psychological characteristics in patients with WAD. The first part was answered in the previous section: disability at follow-up was predicted only by initial level of disability. The predictors of psychological distress differed for the two follow-ups.

The multiple regression analysis at T1 revealed that a higher level of psychological distress was predicted only by higher initial pain and disability even when controlling for baseline psychological distress. The level of disability has already been associated to psychological distress in the literature [61]. At T2 the results of the multivariable analysis indicated that younger age and higher baseline distress were the only adverse prognostic factors. Initial NDI score was not significant in their presence in the model. According to two other studies, pre-injury or initial post-injury psychological state is predictive of a poor prognosis regarding psychological outcomes in persons with WAD [36,60]. Our findings imply that in the short-term, disability affects the psychological state of patients with chronic WAD who are treated by a multidisciplinary team, but in the long run the strongest

prognostic factor is initial psychological distress. The fact that younger age was also a risk factor may indicate that older patients accept their condition more easily and cope better with persistent WAD symptoms. Older patients have more work experience and possibly cope better with their symptoms in the work environment as well, which may decrease their level of psychological distress after return to work.

An interesting finding in the univariate analysis on predictors of psychological distress was that persons who considered themselves as being at fault for their injury were at risk for higher psychological distress at T2. This could probably be explained by the fact that perception of fault may lead to blame or guilt which are related to psychological distress [69].

4.5.3 Return to Work

Psychosocial factors appear to influence return to work in patients with musculoskeletal pain [62]. Our results suggest that this conclusion may be valid for patients with chronic WAD as well. Having greater social support at work (e.g. a supervisor who pays attention to what the worker says; a supervisor who succeeds in getting everyone to work together; co-workers who are amicable and facilitate the realization of the work) predicted return to occupational activity at T1 even in the presence of initial pain and disability in the multivariable model. Social support at work has been identified as a prognostic factor for return to work in numerous studies on patients with musculoskeletal pain [63,70-74]. Interestingly, although

patients' expectations on return to work have also been consistently found to be of prognostic value in the literature [63-65,72,75-79], in our study they had no predictive ability. A possible explanation for this is that there may have been some social desirability bias since only one of the patients in our sample reported negative expectations regarding return to work. Also, those patients who adhered to the intensive rehabilitation program may have already been motivated to return to work, suggesting a bias in our sample with this outcome. None of the potential predictors were found to significantly affect return to work at T2. This was probably due to the loss to follow-up of two other patients which decreased the statistical power of our analysis. However, it is still possible that socio-demographic factors, psychosocial factors and pain and disability measured at baseline do not affect return to work of patients with chronic WAD at a longer follow-up and that other factors come into play at this point of time.

4.5.4 Limitations

Our study was limited by its small sample size. It decreased the statistical power of our multivariable models and we couldn't include all the variables that were significant in the univariate analyses. The losses to follow-up could have introduced some selection bias. Those lost at T1 were older than the rest of the sample; however, there were no differences for age or other variables at T2. There is a possibility of social desirability bias since we used self-report measurement tools. This is probably the case with our results on patients' expectations of return to work. Another source of possible bias is the fact that we could not control for a

concomitant head injury as a confounding variable. Patients who were accepted in the PSP program were not screened for brain injury and there was not enough specific information in their medical files at the rehabilitation centre to make a retrospective diagnosis.

4.6 Conclusion

Our results indicate that baseline pain and disability is the only factor affecting disability post-rehabilitation in patients with chronic WAD treated in a multidisciplinary environment. On the other hand, psychosocial factors play a role in the prognosis of psychological distress and return to work. These findings have several clinical implications. Persons with chronic WAD at risk for persistent high levels of disability and psychological distress can be identified by means of the validated Neck Disability Index and General Health Questionnaire. Efficient multimodal programs may target only patients with levels of disability that are amenable to rehabilitation, especially in the cases of short, intensive rehabilitation programs. Future studies may be needed to determine the range of levels of disability that are most likely to benefit from multidisciplinary rehabilitation programs and alternative treatments for patients outside this range should also be identified. Subjects who report low social support at work and those with psychological distress may possibly benefit from additional psychological intervention. The effect of psychosocial and physical factors on the recovery of patients with chronic WAD treated in a multidisciplinary environment should be explored in studies with large cohorts.

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Table 1. Baseline Characteristics (n=28)

Characteristic	
Mean age (SD)	33.29 (8.96)
Female n (%)	18 (64.3)
Education level ≤ high school n (%)	18 (64.3)
Occupation* n (%)	
Manual	8 (28.6)
Mixed	8 (28.6)
Non-manual	12 (42.8)
Mean number of days since injury n (SD)	188.68 (86.55)
Mean NDI at T0 (SD)	22.89 (8.5)
Mean GHQ at T0 (SD)	16.5 (6.23)

* According to the classification published by the Institut de recherche Robert-Sauvé en santé et en sécurité du travail (IRSST) [80]. Manual category: professions which require: the manipulation of heavy or medium loads on a regular basis, the manipulation of lighter loads by maintaining a continuous static posture or professions with continuous repetitive work. Mixed category: professions which require: the manipulation of lighter loads by maintaining a discontinuous static posture, occasional manipulations of medium or heavy loads, numerous movements and manipulations of a light load, or repetitive discontinuous work. Non-manual category: professions with negligible manipulated loads and physical activity.

Table 2. Predictors of Pain and Disability (NDI) and Psychological Distress (GHQ) (Backward Multiple Linear Regression)

Outcome	Significant predictors	ß*	p-value	R^2 (%)	Eliminated variables	ß*	p-value
NDI at T1 (n=25)	NDI at T0	.793	<.001	62.9	1.**Catastrophizing 2. Age	.105 -.227	.48 .12
NDI at T2 (n=23)	NDI at T0	.785	<.001	61.7	1.**Catastrophizing 2. Age	.177 -.231	.29 .14
GHQ at T1 (n=25)	NDI at T0	.566	.003	32	1. Baseline GHQ	.292	.16
GHQ at T2 (n=23)	GHQ at T0 Age	.56 -.372	.002 .028	51.7	1. Baseline NDI	.246	.26

* Standardized b-coefficient

** Order in which the variables were eliminated

CHAPTER 5

SUPPLEMENTAL RESULTS

These analyses were conducted to permit comparisons between the outcomes of the PSP rehabilitation program and other studied multidisciplinary programs for chronic WAD. To describe recovery post rehabilitation, we classified the patients into three groups: recovered (0-4 points on the NDI), mild pain and disability (5-14), and moderate/severe pain and disability (14-50). This classification is based on categories established by the authors of the NDI (215). Patients' mean baseline and follow-up NDI and GHQ scores, categories of pain and disability, and return to work are presented in Table 2.

As indicated in the table, patients improved over time. Sixteen percent were 'recovered' at T1 and 26% at T2. Using Fisher's exact test, we determined that the proportion of recovered patients at T2 was significantly higher than at T0 ($p=0.037$). The number who had moderate to severe disability at baseline decreased over the two time periods. Compared to baseline, we found a significant decrease in the proportion of patients with moderate to severe disability at T2 ($p=0.029$). These results do not allow us to make conclusions about the effectiveness of the rehabilitation program since this was not a randomized controlled trial. However, we will compare in a descriptive analysis the outcomes of the PSP program with those of other multidisciplinary rehabilitation programs.

Table 2. Baseline and Follow-Up Results Regarding Level of Pain and Disability, Psychological Distress and Return to Work

Variable	T0 (n=28)	T1 (n=25)	T2 (n=23)
Mean NDI (SD)	22.89 (8.5)	17.6 (9.7)*	14.57 (10.04)*
Disability categories n (%)			
Recovered	1 (3.6)	4 (16)	6 (26.1)*
Mild pain and disability	3 (10.7)	4 (16)	4 (17.4)
Moderate/severe pain and disability	24 (85.7)	17 (68)	13 (56.5)*
Mean GHQ (SD)	16.5 (6.23)	14.68 (7.61)	13.65 (6.55)*
Patients who returned to work n (%)		16 (66.7)**	15 (68.2)***

* Statistically significant differences comparing to T0 ($p<0.05$)

** N=24 (one patient cited reasons unrelated to disability regarding not returning to work)

*** N=22 (one patient cited reasons unrelated to disability regarding not returning to work)

CHAPTER 6

DISCUSSION

According to our results higher initial NDI score predicted higher neck pain and disability at both follow-ups, and higher psychological distress at the short-term post-rehabilitation interview. Younger age and higher initial GHQ score were associated with higher levels of psychological distress three months post-rehabilitation. Having greater social support at work was prognostic of return to work at the first follow-up. Sixteen percent of the subjects felt recovered at T1. This proportion increased to 26.1% at the second follow-up. The majority of patients returned to work after rehabilitation (66.7% at T1 and 68.2% at T2).

Since the main results of this study were discussed in Chapter 4, in this chapter we will discuss a) outcomes of rehabilitation programs for chronic WAD and compare these with our supplemental results b) possible impacts of the results on practice.

6.1 Descriptive Analysis of Outcomes of Rehabilitation Programs for Chronic WAD

Several multidisciplinary rehabilitation programs have been investigated in the chronic WAD field. Heikkila et al. (56) evaluated the effect on sick-leave, coping resources and life satisfaction of a six-week multidisciplinary rehabilitation program for patients with chronic WAD and musculoskeletal pain in the neck or back. The authors performed a follow-up two years after the end of the rehabilitation program

and documented sick-leave, coping resources and life satisfaction. At follow-up 26% of patients with WAD in their sample were working part or full-time, 34% were attending vocational rehabilitation programs or training, and 40% were on sick leave. Compared to our rates (Table 2) their percentage of return to work seems much lower. Our follow-up interviews were performed at an earlier stage (discharge and three months post-rehabilitation) which may indicate a more rapid return to work. On the other hand, it is possible that some patients relapse as time goes on. However, Heikkila did not report the baseline disability level of their patients and we couldn't compare our samples regarding this factor. Moreover, our patients were referred to multidisciplinary rehabilitation much quicker than the subjects in the study of Heikkila et al. This could indicate that their patients were less amenable to rehabilitation than ours.

Vendrig et al. (59) documented the improvements of patients with chronic WAD, who attended an intensive four-week multidisciplinary treatment program. The measured level of disability at discharge and follow-up was almost half as low as the level of disability at baseline. Twenty seven percent of patients were deemed recovered after the program and 38% at follow-up. Moreover, the authors observed a complete or partial return-to-work rate of 92% at the six month follow-up. The sample of Vendrig et al. and our sample were difficult to compare. Our subjects had a higher baseline disability level, were younger, and had a shorter duration of symptoms. Vendrig et al. did not use a neck specific disability questionnaire, but used the Quebec Back Pain Disability Scale. The mean level of

disability and the percentage of recovered subjects at follow-up in their study appear to be better than in our sample. Their return to work rate was much higher than ours. However, the follow-up periods were different and possibly, our return to work rate would have increased had we followed our subjects for a longer period. Keeping in mind the fact that the subjects in the study of Vendrig et al. had longer duration of symptoms prior to rehabilitation, better outcomes in terms of disability levels at follow-up and a shorter treatment program, it seems that the multimodal program studied by Vendrig et al. was more beneficial than PSP. However, an in-depth analysis of the components of both programs is needed to confirm this conclusion (249).

Sterner et al. (153) evaluated the effectiveness of two interdisciplinary rehabilitation programs with similar content, of five and eight weeks duration (respectively three and two days of treatment per week). At discharge and at the six month follow-up the mean pain intensity level was only slightly lower than at baseline. The reported proportion of people who were working six months post-rehabilitation was 21.3%. The samples of our study and that of Sterner et al. were comparable in terms of age and duration of symptoms prior to rehabilitation. Their patients seemed to have more intense neck pain than ours at baseline and both follow-up periods. The reported rate of persons who returned to work was much lower than ours even though our follow-up was shorter. This finding and the fact that the samples were comparable in terms of age and symptom duration, suggest that PSP might have an advantage over the programs studied by Sterner et al.

This conclusion, should also be verified by an in-depth analysis of the components of the programs.

In a randomized controlled trial Stewart et al. (58) compared the effectiveness of advice sessions (including behavioral treatment) versus a six-week advice and exercise program for people with chronic WAD. The mean pain and disability level at follow-up had decreased from moderate (at baseline) to mild, and remained mild at the 12 month follow-up. At discharge 60% of patients who took part in the advice and exercise program were working; 12 months later this proportion increased to 63%. The exercise and advice treatment was found to be superior to the advice only program, but the difference was small and only at the short-term follow-up. The patients participating in PSP were younger and had a shorter duration of symptoms compared to the subjects in the study of Stewart et al. The mean baseline disability and fear of movement scores were higher in our sample. Regarding the outcomes, the patients participating in the advice and exercise program reported a lower level of pain and disability at discharge and follow-up, whereas the patients taking part in PSP had a better return to work rate. PSP and the exercise and advice program seem to be comparable in terms of effectiveness.

The results of studies evaluating intensive multimodal treatment programs for chronic WAD suggest that they are beneficial, however, they may not have a long-lasting advantage over advice only sessions. The PSP program costs the

Société d'Assurance Automobile du Québec approximately $8840 per person for the usual seven-week treatment (including the medical, psychological, and physical capacity evaluations). The program seems to have a positive effect on patients' return to work and post-rehabilitation disability levels but cost-effectiveness needs to be evaluated. Appropriately-designed studies are required to compare the effectiveness and cost-effectiveness of multidisciplinary rehabilitation with other treatments such as usual individual care, advice sessions or radio-frequency neurotomy. This recommendation is also in concordance with the conclusions of Cassidy et al., 2007 (55). They followed a cohort of patients with subacute and chronic WAD with the aim of comparing the effectiveness of group fitness training, outpatient and inpatient multidisciplinary rehabilitation, and individual treatment. Both multimodal programs did not prove to have any advantages over the usual individual care. The authors stipulated that multimodal rehabilitation programs for WAD should be tested in randomized trials before being implemented.

6.2 Impact of Results on Practice

According to our results initial pain and disability level of patients with chronic WAD undergoing multimodal rehabilitation was the only factor prognostic of post-rehabilitation pain and disability. If this conclusion is confirmed by other studies with larger samples, we could possibly increase the chances of success by identifying a cutoff level below which persons are most likely to benefit from multidisciplinary rehabilitation. Thus, triaging patients according to baseline disability and pain level could increase the cost-effectiveness of rehabilitation care

offered to persons with chronic WAD. It could be easily implemented in clinical settings since clinicians would only need to administer a short validated questionnaire, such as the Neck Disability Index, in order to identify patients most likely to benefit from specific rehabilitation interventions.

Categorizing patients according to prognostic factors and offering different treatments in order to increase chances for success is not a new approach from an ethical point of view. Stroke rehabilitation is a good example of that. Patients with acute stroke are stratified into mildly, moderately or severely disabled (according to known prognostic factors such as: age (243), functional status (243-245), infarct volume (246;247), severity of neurological impairment (245)) and different treatments are offered correspondingly. Perhaps the same approach could be used in chronic WAD rehabilitation. Moreover, the triage of patients can be done by means of a short validated pain and disability measure that is easy to administer and score.

The current study sample was not large enough to create several strata according to baseline pain and disability levels. Studies with larger samples could determine the range of levels of disability that are most likely to benefit from multimodal rehabilitation. Alternative treatments for patients outside this range should also be identified and evaluated.

CHAPTER 7

CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

Baseline pain and disability affects disability post-rehabilitation in patients with chronic WAD treated in a multidisciplinary environment. Psychosocial factors such as higher baseline psychological distress and less social support at work are linked with psychological distress post rehabilitation and lower return to work.

Knowledge of prognostic factors may help rehabilitation professionals orient persons with certain profiles towards more effective models of care. Patients with very high initial disability levels may not be good candidates for multidisciplinary rehabilitation programs and may be more suitable for other types of interventions. Subjects who report low social support at work and those with psychological distress may possibly benefit from additional psychological intervention. These proposed solutions need to be explored in studies with larger samples of patients with WAD. In addition, the efficacy and cost-effectiveness of multidisciplinary rehabilitation programs such as PSP should be evaluated via a randomized clinical trial design.

CHAPTER 8

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APPENDIX A

Pour fins de renouvellement, le Comité d'éthique de la recherche des établissements du CRIR, selon la procédure d'évaluation accélérée en vigueur, a examiné le projet de recherche **CRIR-094-0404** intitulé :

« Caractérisation biomécanique et psychosociale des gens atteints de désordres associés au coup de fouet cervical et objectivation de leurs chances de réussite au sein d'un programme clinique de réinsertion au travail».

Présenté par: **Julie Côté**

Le présent projet répond aux exigences éthiques de notre CÉR. Ce projet se déroule dans le site du CRIR suivant : **Hôpital juif de réadaptation.**

Ce certificat est valable pour un an. En acceptant le présent certificat d'éthique, le chercheur s'engage à :

1. Informer le CÉR de tout changement qui pourrait être apporté à la présente recherche ou aux documents qui en découlent (Formulaire M) ;
2. Rapporter aux participants toute information susceptible de modifier leur consentement ;
3. Fournir annuellement au CÉR un rapport d'étape l'informant de l'avancement des travaux de recherche (Formulaire R) ;
4. Demander le renouvellement annuel de son certificat d'éthique ;
5. Aviser le CÉR de l'abandon ou de l'interruption prématurée du projet de recherche ;
6. Tenir et conserver, selon la procédure prévue dans la *Politique portant sur la conservation d'une liste des sujets de recherche*, incluse dans le cadre réglementaire des établissements du CRIR, une liste des personnes qui ont accepté de prendre part à la présente étude ;
7. Envoyer au CÉR une copie de son rapport de fin de projet / publication.

[redacted]

Me Michel T. Giroux
Président du CÉR

Date d'émission
17 août 2006

APPENDIX B

Formulaire de consentement
(DACFC – volet psychosocial)

1 - Titre du projet

Caractérisation biomécanique et psychosociale des individus atteints de désordres associés au coup de fouet cervical et objectivation de leurs chances de retour permanent au travail suite à un protocole de réadaptation intensif personnalisé.

2 - Responsable(s) du projet

Julie Côté, Ph.D. professeure adjointe, Département de kinésiologie et d'éducation physique
Université McGill, (450) 688-9550, poste 4813

Debbie Feldman, Ph.D., professeure adjointe, École de réadaptation / Dép. de médecine sociale et préventive, Université de Montréal, (514) 343-6111 poste 1252

Gaétan Filion, M.D., physiatre, directeur médical, programme pédiatrique, Hôpital juif de réadaptation, (450) 688-9550

Joyce Fung, PT, Ph.D., professeure agrégée, École de physiothérapie et d'ergothérapie, Université McGill, (450) 688-9550 poste 529

Nancy St-Onge, Ph.D., chercheure post-doctorale, École de physiothérapie et d'ergothérapie, Université McGill, (450) 688-9550 poste 623

3 - Description du projet et de ses objectifs

Le but de ce projet est de mieux comprendre les caractéristiques psychosociales et biomécaniques d'individus ayant subi un coup de fouet cervical. Nous visons à développer et valider des approches quantitatives permettant de mieux évaluer l'atteinte pathologique de ces individus.
Vingt-cinq sujets ayant subi un coup de fouet cervical seront recrutés parmi la clientèle du Programme d'évaluation, de développement et d'intégration professionnelle (PÉDIP) de l'hôpital juif de réadaptation. Un groupe de vingt-cinq sujets sains sera également recruté. Nous désirons comparer les caractéristiques de la posture entre les sujets sains et les sujets ayant subi un coup de fouet cervical. Les individus souffrant d'un coup de fouet cervical seront évalués avant ainsi qu'après le protocole de réadaptation PÉDIP. Nous voulons ainsi définir la condition pathologique reliée au coup de fouet cervical et ainsi pouvoir mieux évaluer les chances de retour sécuritaire au travail des individus ayant subi un coup de fouet cervical.

4 - Nature et durée de la participation

Le projet de recherche auquel je suis invité à participer vise à comprendre la condition psychosociale des individus ayant subi un coup de fouet cervical. Les tests se déroulent au centre de recherche de l'Hôpital juif de réadaptation. La participation qui m'est demandée comporte trois séances d'une heure. Lors des évaluations, je devrai remplir des questionnaires d'évaluation psychosociale.

La première séance aura lieu au début des traitements PÉDIP et la deuxième lorsque les traitements seront terminés. La troisième séance sera effectuée trois mois après la deuxième séance. Lors de la première séance je devrai remplir cinq questionnaires d'évaluation psychosociale. Lors des deuxième et troisième séances je devrai remplir trois questionnaires.

5 - Avantages pouvant découler de ma participation

Je ne retirerai personnellement pas d'avantages à participer à cette étude. Toutefois, j'aurai contribué à l'avancement de la science.

6 - Risques pouvant découler de ma participation

Ma participation à ce projet de recherche ne me fait courir, sur le plan médical, aucun risque que ce soit. Il est aussi entendu que ma participation au projet n'affectera pas les soins et les services que je reçois ou recevrai de l'Hôpital juif de réadaptation.

7 - Inconvénients personnels

La participation à trois séances d'une heure peut représenter pour certaines personnes un inconvénient.

8 - Accès à mon dossier médical

J'autorise les responsables du projet à obtenir accès à mon dossier médical. Je comprends que seuls les renseignements relatifs à mes désordres associés au coup de fouet cervical et à l'évolution des symptômes seront consultés. J'autorise aussi les responsables du projet à permettre l'accès à ces renseignements à d'autres membres de l'équipe de recherche.

9 - Confidentialité

Tous les renseignements personnels recueillis à mon sujet au cours de l'étude seront codifiés afin d'assurer ma confidentialité. Ces données seront conservées sous clé au centre de recherche de l'Hôpital juif de réadaptation par un responsable de l'étude pour une période de cinq ans. Seuls les membres de

l'équipe de recherche y auront accès. En cas de présentation de résultats de cette recherche ou de publication, rien ne pourra permettre de m'identifier.

10 - Questions concernant cette étude

Le(s) chercheur(s) présent(s) lors de la collecte des données s'engage(nt) à répondre de façon satisfaisante à toutes mes questions concernant le projet de recherche.

11 - Retrait de la participation du sujet

Ma participation au projet de recherche décrit ci-dessus est tout à fait libre et volontaire. Il est entendu que je pourrai, à tout moment, mettre un terme à ma participation sans que cela n'affecte les soins et les services de santé que je reçois ou recevrai de l'Hôpital juif de réadaptation.

En cas de retrait de ma part, les documents audiovisuels et écrits me concernant seront détruits.

12 - Clause de responsabilité

En acceptant de participer à cette étude, je ne renonce à aucun de mes droits ni ne libère les chercheurs, le commanditaire ou les institutions impliquées de leurs obligations légales et professionnelles.

13 - Indemnité compensatoire

Je ne recevrai pas de compensation financière pour ma participation à cette étude.

14 - Personnes-ressources

Si je désire poser des questions sur le projet, signaler un effet adverse et/ou un incident défavorable, je peux rejoindre en tout temps Dre Julie Côté, professeure adjointe au Département de kinésiologie et d'éducation physique de l'université McGill au (450) 688-9550, poste 4813.

De plus, si j'ai des questions sur mes droits et recours ou sur ma participation à ce projet de recherche, je peux communiquer avec Me Anik Nolet, coordonnatrice à l'éthique de la recherche des établissements du CRIR au (514) 527-4527 poste 2643 ou par courriel à l'adresse suivante: [redacted]

CONSENTEMENT

Je déclare avoir lu et compris le présent projet, la nature et l'ampleur de ma participation, ainsi que les risques auxquels je m'expose tels que présentés dans le présent formulaire. J'ai eu l'occasion de poser toutes les questions concernant les différents aspects de l'étude et de recevoir des réponses à ma satisfaction.

Je, soussigné(e), accepte volontairement de participer à cette étude. Je peux me retirer en tout temps sans préjudice d'aucune sorte. Je certifie qu'on m'a laissé le temps voulu pour prendre ma décision et je sais qu'une copie de ce formulaire figurera dans mon dossier médical.

Une copie signée de ce formulaire d'information et de consentement doit m'être remise.

NOM DU SUJET **SIGNATURE**

_____ _____

Fait à _____, le _____, 20_____.

ENGAGEMENT DU CHERCHEUR

Je, soussigné (e), _____ , certifie
(a) avoir expliqué au signataire les termes du présent formulaire;
(b) avoir répondu aux questions qu'il m'a posées à cet égard;
(c) lui avoir clairement indiqué qu'il reste, à tout moment, libre de mettre un terme à sa participation au projet de recherche décrit ci-dessus;
et (d) que je lui remettrai une copie signée et datée du présent formulaire.

_____
Signature du responsable du projet
ou de son représentant

Fait à _____, le _____ 20__.

Consent form
(WAD - psychosocial)

1 - Title of project

Biomechanical and psychosocial characterization of individuals suffering from whiplash-associated disorders and objectification of their chances of permanently returning to work after a personalized intensive rehabilitation protocole.

2 - Researchers in charge of project

Julie Côté, Ph.D. Assistant professor, Department of Kinesiology and Physical Education, McGill University, (450) 688-9550, ext. 4813

Debbie Feldman, Ph.D., Assistant professor, School of Rehabilitation/Department of Social and Preventive Medicine, University of Montreal, (514) 343-6111 ext. 1252

Gaétan Filion, M.D., Physiatrist, Medical director, Pediatric programme, Jewish Rehabilitation Hospital, (450) 688-9550

Joyce Fung, PT, Ph.D., Associate professor, School of Physical and Ergotherapy, McGill University, (450) 688-9550 ext. 529

Nancy St-Onge, Ph.D., Postdoctoral fellow, School of Physical and Ergotherapy, McGill University, (450) 688-9550 ext. 623

3 - Project description and objectives

The objective of this project is to better understand psychosocial and biomechanical characteristics of individuals suffering from whiplash-associated disorders. Our goal is to develop and validate quantitative approaches that will allow a better evaluation of the severity of the pathology in this population.
Twenty-five subjects suffering from a whiplash injury will be recruited from the patients taking part in the *Programme d'évaluation, de développement et d'intégration professionnelle* (PÉDIP). A group consisting of twenty-five healthy subjects will also be recruited. We want to compare postural characteristics between healthy subjects and those suffering from a whiplash injury. Whiplash individuals will be evaluated before and after the PÉDIP rehabilitation protocole. Using this information, we wish to define the pathological condition associated with a whiplash injury and therefore better evaluate the chances of safely returning to the workplace of individuals suffering from a whiplash injury.

4 - Nature and duration of participation

The research project to which I am invited to participate aims at understanding the psychosocial condition of individuals suffering from a whiplash injury. The tests will

be performed at the Research Center of the Jewish Rehabilitation Hospital. I will have to come three times to the center for a period of one hour each time. During those sessions I will have to fill in psychosocial measurement questionnaires.
The first session will take place at the beginning of the PÉDIP treatments and the second one when the treatments will be over. The third session will be conducted three months after the second session. During the first session I will have to fill in five psychosocial measurement questionnaires. During the second and third sessions I will have to fill in three questionnaires.

5 - Advantages associated with my participation

I will not personally benefit from advantages by participating in this study. However, I will contribute to science.

6 - Risks associated with my participation

My participation in this project does not put me at any medical risk. Moreover, my participation will not affect care and services I receive at the Jewish Rehabilitation Hospital.

7 - Personal inconvenients

Participating in three one-hour sessions might be an inconvenient for some individuals.

8 - Access to my medical file

I authorize access to my medical file to the persons responsible for this project. I understand that only the information concerning my whiplash-associated disorders and the evolution of the symptoms will be used. I also authorize the persons responsible for this project to give access to that information to other members of the research team.

9 - Confidentiality

All the personal information collected for this study will be codified to insure confidentiality. Information will be kept under locking key at the research center of the Jewish Rehabilitation Hospital by one of the persons responsible for the study for a period of five years. Only the people involved in the project will have access to this information. If the results of this research project are presented or published, nothing will allow my identification.

The results obtained will be used to set up a database. The information being codified, nothing will allow my identification and it will not be possible to associate me with the results.

10 - Questions concerning the study

The researchers present during the testing should answer my questions concerning the project satisfactorily.

11 - Withdrawal of subject from study

My participation in the research project described above is completely voluntary. I have the right to withdraw from the study at any moment without affecting health cares and services I receive from the Jewish rehabilitation hospital.

Should I withdraw form the study, all audiovisual and written document concerning myself will be destroyed.

12 - Responsibility

By accepting to enter this study, I do not surrender to my rights and do not free the researchers, sponsor or the institutions involved from their legal and professional obligations.

13 - Monetary compensation

I will not receive a monetary compensation for participating to this study.

14 - Contact persons

If I need to ask questions about the project, signal an adverse effect and/or an incident, I can contact at any time Dr. Julie Côté, Assistant professor in the Department of Kinesiology and Physical Education, McGill University at (450) 688-9550, ext. 4813.

Also, if I have questions concerning my rights and remedy or my participation to this research project, I can contact Me Anik Nolet, Research ethics co-ordinator of CRIR at (514) 527-4527 ext. 2643 or by [redacted]

CONSENT

I declare to have read and understood the project, the nature and the extent of the project, as well as the risks I am exposed to as describe in the present document. I had the opportunity to ask all my questions concerning the different aspects of the study and to receive explanations to my satisfaction.

I, undersigned, voluntarily accept to participate in this study. I can withdraw at any time without any prejudice. I certify that I have received enough time to take my decision and I know that a copy of this consent form will be added to my medical file.

A signed copy of this information and consent form should be given to me.

NAME OF SUBJECT **SIGNATURE**

_____ _____

Done in _____, _____, 20_____.

COMMITMENT OF RESEARCHER

I, undersigned, _____ , certify
(a) having explained to the signatory the terms of the present form ;
(b) having answered all questions he/she asked concerning the study ;
(c) having clearly told him/her that he/she is at any moment free to withdraw from the research project described above ;
and (d) that I will give him/her a signed and dated copy of the present document.

_____
Signature of person in charge of the project
or representative

Done in _____, _____ 20__.

APPENDIX C

Caractéristiques démographiques, attentes quant au retour au travail et information sur l'accident

1. Numéro du client: ____
2. Numéro de téléphone:_____
3. Date de l'entrevue: (jour/mois/année) : _____/_____/_____
4. Âge:_____
5. Sexe: Mâle ❑ Femelle ❑
6. Ethnie:_____
7. État civil (encerclez ou soulignez votre choix):

Célibataire	Marié	Séparé	Divorcé	Veuf/Veuve	Vie Ensemble

8. Dernière année de scolarité:

Primaire	Secondaire	CEGEP	Université

9. Occupation: _____
10. Nombre d'heures de travail par semaine: _____
11. Description du travail:_____

_____

12. Est-ce que vous vous attendez à ce que le programme de réadaptation PSP vous aide à retourner au travail et garder votre emploi?

Oui	Non

13. Quand est-ce que votre accident a eu lieu? (jour/mois/année) _____/_____/_____
14. Est-ce que vous étiez conducteur ou passager?

Conducteur	Passager

Autre (précisez): _____

15. Selon l'assurance qui était responsable de l'accident?

Vous	Pas vous

Autre (précisez): _____

16. Selon vous qui était responsable de l'accident?

Vous	Pas vous

Autre (précisez): _____

Demographic Characteristics, Expectations of Return to Work and Information on the Accident

1. Client number: _____
2. Telephone number:_____
3. Date of the interview: (day/month/year) ____ /____/_____
4. Age:_____
5. Sex: Male ❑ Female ❑
6. Ethnicity:_____
7. Marital Status (circle or underline your choice):

Single	Married	Separated	Divorced	Widow	Living together

8. Last year of education completed:

Primary	Secondary	CEGEP	University

9. Occupation: _____
10. Number of hours worked per week: _____
11. Job description: _____

_____

12. Do you expect that the PSP rehabilitation program will help you to return to work and keep your job?

Yes	No

13. When was your accident? (day/month/year) _____/_____/_____
14. Were you driving or were you a passenger?

Driving	Passenger

Other (please, specify): _____

15. According to the insurance whose fault was the accident?

Yours	Not Yours

Other (please, specify): _____

16. According to you whose fault was the accident?

Yours	Not Yours

Other (please, specify): _____

APPENDIX D

Neck Disability Index (NDI)

Lisez bien les instructions pour chacune des questions et répondez à toutes les questions. Merci de votre coopération. Ce questionnaire a été établi afin de permettre à votre médecin d'apprécier le retentissement de vos douleurs cervicales sur votre vie au quotidien. Veuillez répondre à toutes les questions en ne cochant que LA case qui vous correspond le mieux. Bien que 2 réponses dans une même rubrique puissent vous correspondre, nous vous remercions de ne cocher qu'une seule case, celle qui se rapporte plus précisément à votre cas.

RUBRIQUE 1 : intensité des douleurs cervicales.

- ❑ Je n'ai pas de douleurs en ce moment.
- ❑ La douleur est très légère en ce moment.
- ❑ La douleur est moyenne en ce moment.
- ❑ La douleur est assez intense en ce moment.
- ❑ La douleur est très intense en ce moment.
- ❑ La douleur est la pire que je puisse imaginer en ce moment.

RUBRIQUE 2 : soins personnels (se laver, s'habiller etc.).

- ❑ Je peux prendre soin de moi normalement sans entraîner plus de douleurs que d'ordinaire.
- ❑ Je peux prendre soin de moi normalement mais cela provoque plus de douleurs que d'ordinaire.
- ❑ M'occuper de moi est douloureux, et je le fais lentement et avec précaution.
- ❑ J'ai besoin d'aide mais je me débrouille pour la plupart de mes soins personnels.
- ❑ J'ai besoin d'une aide quotidienne pour la plupart de mes soins personnels.
- ❑ Je ne peux pas m'habiller, je me lave avec difficulté et je reste au lit.

RUBRIQUE 3 : soulever des charges.

- ❑ Je peux soulever des charges lourdes sans plus de douleurs que d'ordinaire.
- ❑ Je peux soulever des charges lourdes mais cela provoque plus de douleurs que d'ordinaire.
- ❑ Les douleurs cervicales m'empêchent de soulever des charges lourdes du sol, mais je peux y arriver si elles sont placées commodément, par exemple sur une table.
- ❑ Les douleurs cervicales m'empêchent de soulever des charges lourdes, mais je peux soulever des charges moyennes ou légères si elles sont posées commodément.
- ❑ Je ne peux soulever que de très légères charges.
- ❑ Je ne peux rien soulever ou porter du tout.

RUBRIQUE 4 : lecture.

- ❑ Je peux lire autant que je le veux, sans douleurs cervicales.
- ❑ Je peux lire autant que je le veux, avec de légères douleurs cervicales.
- ❑ Je peux lire autant que je le veux, avec des douleurs cervicales modérées.
- ❑ Je ne peux pas lire autant que je le veux à cause de douleurs cervicales modérées.
- ❑ Je peux à peine lire à cause de douleurs cervicales intenses.
- ❑ Je ne pas lire du tout à cause de mes douleurs cervicales.

RUBRIQUE 5 : maux de tête.

- ❑ Je n'ai pas du tout de maux de tête.
- ❑ J'ai des maux de tête légers et peu fréquents.
- ❑ J'ai des maux de tête modérés et peu fréquents.
- ❑ J'ai des maux de tête modérés et fréquents.
- ❑ J'ai des maux de tête intenses et fréquents.
- ❑ J'ai presque tout le temps des maux de tête.

RUBRIQUE 6 : concentration.

- ❑ Je peux me concentrer complètement sans difficultés, quand je le veux.
- ❑ Je peux me concentrer complètement avec de légères difficultés, quand je le veux.
- ❑ Il m'est relativement difficile de me concentrer, quand je le veux.
- ❑ J'ai beaucoup de difficultés à me concentrer, quand je le veux.
- ❑ J'ai d'énormes difficultés à me concentrer, quand je le veux.
- ❑ Je n'arrive pas du tout à me concentrer.

RUBRIQUE 7 : travail (professionnel ou personnel).

- ❑ Je peux travailler autant que je le veux.
- ❑ Je ne peux faire que mon travail courant, mais rien de plus.
- ❑ Je peux faire la plus grande partie de mon travail courant, mais rien de plus.
- ❑ Je ne peux pas faire mon travail courant.
- ❑ Je peux à peine travailler.
- ❑ Je ne peux pas travailler du tout.

RUBRIQUE 8 : conduite.

- ❑ Je peux conduire ma voiture sans aucune douleur cervicale.
- ❑ Je peux conduire ma voiture autant que je le veux, avec de légères douleurs cervicales.
- ❑ Je peux conduire ma voiture autant que je le veux, avec des douleurs cervicales modérées.
- ❑ Je ne peux pas conduire ma voiture autant que je le veux, en raison de douleurs cervicales modérées.
- ❑ Je peux à peine conduire en raison de douleurs cervicales intenses.
- ❑ Je ne peux pas du tout conduire ma voiture à cause des douleurs cervicales.

RUBRIQUE 9 : sommeil (avec ou sans prise médicamenteuse).

- ❑ Mon sommeil n'est pas perturbé.
- ❑ Mon sommeil est à peine perturbé (moins d'1 heure sans dormir).
- ❑ Mon sommeil est un peu perturbé (1-2 heures sans dormir).
- ❑ Mon sommeil est modérément perturbé (2-3 heures sans dormir).
- ❑ Mon sommeil est très perturbé (3-5 heures sans dormir).
- ❑ Mon sommeil est complètement perturbé (5-7 heures sans dormir).

RUBRIQUE 10 : loisirs (cuisine, sports, activités manuelles ...).

- ❑ Je peux participer à toutes mes activités de loisirs sans aucune douleur cervicale.
- ❑ Je peux participer à toutes mes activités de loisirs, avec quelques douleurs cervicales.
- ❑ Je peux participer à la plupart de mes activités habituelles de loisirs, mais pas à toutes, à cause de mes douleurs cervicales.
- ❑ Je ne peux participer qu'à quelques unes de mes activités de loisirs habituelles, à cause de mes douleurs cervicales.
- ❑ Je peux à peine participer à des activités de loisirs, à cause de mes douleurs cervicales.
- ❑ Je ne peux participer à aucune activité de loisir à cause de mes douleurs cervicales.

Neck Disability Index (NDI)

This questionnaire has been designed to give the doctor information as to how your neck pain has affected your ability to manage in everyday life. Please answer every section and mark in each section only the ONE box which applies to you. We realize you may consider that two of the statements in any one section relate to you, but please just mark the **one** box which most closely describes your problem.

SECTION 1--Pain Intensity

- ❑ I have no pain at the moment
- ❑ The pain is mild at the moment.
- ❑ The pain comes and goes and is moderate.
- ❑ The pain is moderate and does not vary much.
- ❑ The pain is severe but comes and goes.
- ❑ The pain is severe and does not vary much.

SECTION 2--Personal Care (Washing, Dressing etc.)

- ❑ I can look after myself without causing extra pain.
- ❑ I can look after myself normally but it causes extra pain.
- ❑ It is painful to look after myself and I am slow and careful.
- ❑ I need some help, but manage most of my personal care.
- ❑ I need help every day in most aspects of self-care.
- ❑ I do not get dressed, I wash with difficulty and stay in bed.

SECTION 3--Lifting

- ❑ I can lift heavy weights without extra pain.
- ❑ I can lift heavy weights, but it causes extra pain.
- ❑ Pain prevents me from lifting heavy weights off the floor but I can if they are conveniently positioned, for example on a table.
- ❑ Pain prevents me from lifting heavy weights, but I can manage light to medium weights if they are conveniently positioned.
- ❑ I can lift very light weights.
- ❑ I cannot lift or carry anything at all.

SECTION 4 --Reading

- ❑ I can read as much as I want to with no pain in my neck.
- ❑ I can read as much as I want with slight pain in my neck.
- ❑ I can read as much as I want with moderate pain in my neck.
- ❑ I cannot read as much as I want because of moderate pain in my neck.
- ❑ I cannot read as much as I want because of severe pain in my neck.
- ❑ I cannot read at all.

SECTION 5--Headache

- ❑ I have no headaches at all.
- ❑ I have slight headaches which come infrequently.
- ❑ I have moderate headaches which come in-frequently.
- ❑ I have moderate headaches which come frequently.
- ❑ I have severe headaches which come frequently.
- ❑ I have headaches almost all the time.

SECTION 6 -- Concentration

- ❑ I can concentrate fully when I want to with no difficulty.
- ❑ I can concentrate fully when I want to with slight difficulty.
- ❑ I have a fair degree of difficulty in concentrating when I want to.
- ❑ I have a lot of difficulty in concentrating when I want to.
- ❑ I have a great deal of difficulty in concentrating when I want to.
- ❑ I cannot concentrate at all.

SECTION 7--Work

- ❑ I can do as much work as I want to.
- ❑ I can only do my usual work, but no more.
- ❑ I can do most of my usual work, but no more.
- ❑ I cannot do my usual work.
- ❑ I can hardly do any work at all.
- ❑ I cannot do any work at all.

SECTION 8--Driving

- ❑ I can drive my car without neck pain.
- ❑ I can drive my car as long as I want with slight pain in my neck.
- ❑ I can drive my car as long as I want with moderate pain in my neck.
- ❑ I cannot drive my car as long as I want because of moderate pain in my neck.
- ❑ I can hardly drive my car at all because of severe pain in my neck.
- ❑ I cannot drive my car at all.

SECTION 9--Sleeping

- ❑ I have no trouble sleeping
- ❑ My sleep is slightly disturbed (less than 1 hour sleepless).
- ❑ My sleep is mildly disturbed (1-2 hours sleepless).
- ❑ My sleep is moderately disturbed (2-3 hours sleepless).
- ❑ My sleep is greatly disturbed (3-5 hours sleepless).
- ❑ My sleep is completely disturbed (5-7 hours sleepless).

SECTION 10--Recreation

- ❑ I am able to engage in all recreational activities with no pain in my neck at all.
- ❑ I am able to engage in all recreational activities with some pain in my neck.
- ❑ I am able to engage in most, but not all recreational activities because of pain in my neck.
- ❑ I am able to engage in a few of my usual recreational activities because of pain in my neck.
- ❑ I can hardly do any recreational activities because of pain in my neck.
- ❑ I cannot do any recreational activities at all.

APPENDIX E

Questionnaire Général sur la Santé (GHQ-12)

Veuillez lire ce qui suit avec attention:

Nous aimerions savoir si vous avez eu des problèmes médicaux et comment, d'une manière générale, vous vous êtes porté CES DERNIÈRES SEMAINES. Veuillez répondre à TOUTES les questions, en entourant la réponse qui vous semble correspondre le mieux à ce que vous ressentez. Il est important que vous essayiez de répondre à TOUTES les questions. Merci beaucoup de votre aide.

Récemment et en particulier ces dernières semaines:

1) Avez-vous été capable de vous concentrer sur tout ce que vous faites?
- ❑ Mieux que d'habitude
- ❑ Comme d'habitude
- ❑ Moins bien que d'habitude
- ❑ Beaucoup moins que d'habitude

2) Avez-vous manqué de sommeil à cause de vos soucis?
- ❑ Pas du tout
- ❑ Pas plus que d'habitude
- ❑ Un peu plus que d'habitude
- ❑ Beaucoup plus de d'habitude

3) Vous êtes-vous senti(e) capable de prendre des décisions?
- ❑ Plus que d'habitude
- ❑ Comme d'habitude
- ❑ Moins bien que d'habitude
- ❑ Beaucoup moins que d'habitude

4) Vous êtes-vous senti(e) constamment tendu ou <<stressé>>?
- ❑ Pas du tout
- ❑ Pas plus que d'habitude
- ❑ Un peu plus que d'habitude
- ❑ Beaucoup plus que d'habitude

5) Avez-vous eu le sentiment de jouer un rôle utile dans la vie?
- ❑ Plus que d'habitude
- ❑ Comme d'habitude
- ❑ Moins utile que d'habitude
- ❑ Beaucoup moins utile que d'habitude

6) Avez-vous eu le sentiment que vous ne pourriez pas surmonter vos difficultés?
- ❑ Pas du tout
- ❑ Pas plus que d'habitude
- ❑ Un peu plus que d'habitude
- ❑ Beaucoup plus que d'habitude

7) Avez-vous été capable d'apprécier vos activités quotidiennes normales?
- ❑ Plus que d'habitude
- ❑ Comme d'habitude
- ❑ Un peu moins que d'habitude
- ❑ Beaucoup moins que d'habitude

8) Avez-vous été capable de faire face à vos problèmes?
- ❑ Mieux que d'habitude
- ❑ Comme d'habitude
- ❑ Un peu moins que d'habitude
- ❑ Beaucoup moins que d'habitude

9) Avez-vous été malheureux (se) et déprimé(e)?
- ❑ Pas du tout
- ❑ Pas plus que d'habitude
- ❑ Un peu plus que d'habitude
- ❑ Beaucoup plus que d'habitude

10) Avez-vous perdu confiance en vous-même?
- ❑ Pas du tout
- ❑ Pas plus que d'habitude
- ❑ Un peu plus que d'habitude
- ❑ Beaucoup plus que d'habitude

11) Vous êtes-vous considéré(e) comme quelqu'un qui ne valait rien?
- ❑ Pas du tout
- ❑ Pas plus que d'habitude
- ❑ Un peu plus que d'habitude
- ❑ Beaucoup plus que d'habitude

12) Vous êtes-vous senti(e) raisonnablement heureux (se), tout bien considéré?
- ❑ Plus que d'habitude
- ❑ Comme d'habitude
- ❑ Un peu moins que d'habitude
- ❑ Beaucoup moins que d'habitude

General Health Questionnaire (GHQ-12)

Please read very carefully.

We should like to know if you have had any medical complaints, and how your health has been in general, over the past few weeks. Please answer all the questions on the following page simply by checking the box next to the answer which you think most nearly applies to you. It is important that you try to answer all of the questions. Thank you very much for your cooperation.

Have you recently:

1) been able to concentrate on what you are doing?
- ❑ Better than usual
- ❑ Same as usual
- ❑ Less than usual
- ❑ Much less than usual

2) lost much sleep over worry?
- ❑ Not at all
- ❑ No more than usual
- ❑ Rather more than usual
- ❑ Much more than usual

3) felt that you were playing a useful part in things?
- ❑ More so than usual
- ❑ Same as usual
- ❑ Less useful than usual
- ❑ Much less useful than usual

4) felt capable about making decisions about things?
- ❑ More so than usual
- ❑ Same as usual
- ❑ Less so than usual
- ❑ Much less capable

5) felt constantly under strain?
- ❑ Not at all
- ❑ No more than usual
- ❑ Rather more than usual
- ❑ Much more than usual

6) felt you couldn't overcome your difficulties?
- ❑ Not at all
- ❑ No more than usual
- ❑ Rather more than usual
- ❑ Much more than usual

7) been able to enjoy your normal day to day activities?
- ❑ More so than usual
- ❑ Same as usual
- ❑ Less than usual
- ❑ Much less than usual

8) have been able to face up to your problems?
- ❑ More so than usual
- ❑ Same as usual
- ❑ Less able than usual
- ❑ Much less able than usual

9) been feeling unhappy and depressed?
- ❑ Not at all
- ❑ No more than usual
- ❑ Rather more than usual
- ❑ Much more than usual

10) been losing confidence in yourself?
- ❑ Not at all
- ❑ No more than usual
- ❑ Rather more than usual
- ❑ Much more than usual

11) been thinking of yourself as a worthless person?
- ❑ Not at all
- ❑ No more than usual
- ❑ Rather more than usual
- ❑ Much more than usual

12) been feeling reasonably happy, all things considered
- ❑ More so than usual
- ❑ About same as usual
- ❑ Less so than usual
- ❑ Much less than usual

APPENDIX F

ÉCHELLE TAMPA DE KINÉSIOPHOBIE (TSK)

Consignes :

Veuillez lire attentivement chaque question et encercler le numéro qui correspond le mieux à vos sentiments.

	Fortement en désaccord	Quelque peu en désaccord	Quelque peu en accord	Fortement en accord
1. J'ai peur de me blesser si je fais de l'activité physique	1	2	3	4
2. Ma douleur ne ferait qu'intensifier si j'essayais de la vaincre	1	2	3	4
3. Mon corps me dit que quelque chose ne va vraiment pas	1	2	3	4
4. Si je faisais de l'activité physique, ma douleur serait probablement soulagée	1	2	3	4
5. Les gens ne prennent pas mon état de santé assez au sérieux	1	2	3	4
6. Mon accident a mis mon corps en danger pour le reste de mes jours	1	2	3	4
7. La douleur signifie toujours que je me suis blessé(e)	1	2	3	4
8. Même si quelque chose aggrave ma douleur cela ne veut pas dire que c'est dangereux	1	2	3	4
9. J'ai peur de me blesser accidentellement	1	2	3	4
10. La meilleure façon d'empêcher que ma douleur s'aggrave est de m'assurer de ne pas faire des mouvements inutiles	1	2	3	4
11. Je n'aurais pas tant de douleurs s'il ne se passait pas quelque chose de grave dans mon corps	1	2	3	4
12. Bien que ma condition soit pénible, je serais mieux si j'étais physiquement actif(ve)	1	2	3	4
13. La douleur m'indique quand arrêter de faire des activités physiques pour que je ne me blesse pas	1	2	3	4
14. Il n'est pas prudent qu'une personne avec un état de santé comme le mien soit physiquement active	1	2	3	4
15. Je ne peux pas faire tout ce qu'une personne normale peut faire parce que j'ai plus de risques de me blesser	1	2	3	4
16. Bien qu'il y ait quelque chose qui me cause beaucoup de douleurs, je ne pense pas que ce soit vraiment grave	1	2	3	4
17. Personne ne devrait être obligé de faire des exercices lorsqu'il(elle) ressent de la douleur	1	2	3	4

TAMPA SCALE FOR KINESIOPHOBIA (TSK)

Instructions :

Please read each of the following statements and circle the number that better represents your feelings

	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree
1. I'm afraid that I might injure myself if I exercise	1	2	3	4
2. If I were to try to overcome it, my pain would increase	1	2	3	4
3. My body is telling me I have something dangerously wrong	1	2	3	4
4. My pain would probably be relieved if I were to exercise	1	2	3	4
5. People aren't taking my medical condition seriously enough	1	2	3	4
6. My accident has put my body at risk for the rest of my life	1	2	3	4
7. Pain always means I have injured my body	1	2	3	4
8. Just because something aggravates my body does not mean it is dangerous	1	2	3	4
9. I am afraid that I might injure myself accidentally	1	2	3	4
10. Simply being careful that I do not make any unnecessary movements is the safest thing I can do to prevent my pain from worsening	1	2	3	4
11. I wouldn't have this much pain if there weren't something potentially dangerous going on in my body	1	2	3	4
12. Although my condition is painful, I would be better off if I were physically active	1	2	3	4
13. Pain lets me know when to stop exercising so that I don't injure myself	1	2	3	4
14. It's really not safe for a person with a condition like mine to be physically active	1	2	3	4
15. I can't do all the things normal people do because it's too easy for me to get injured	1	2	3	4
16. Even though something is causing me a lot of pain, I don't think it's actually dangerous	1	2	3	4
17. No one should have to exercise when he/she is in pain	1	2	3	4

APPENDIX G

Questionnaire pour faire face à la douleur (CSQ)

Consigne: Quand vous avez mal, vous réagissez de diverses manières. Indiquez, pour chacune des stratégies suivantes, si vous l'utilisez pour faire face à votre douleur.

Quand j'ai mal,	0 Jamais	1	2	3 Parfois	4	5	6 Toujours
1. J'essaie de prendre de la distance par rapport à la douleur, comme si elle était dans le corps de quelqu'un d'autre.							
2. J'essaie de penser à quelque chose d'agréable.							
3. Je trouve que c'est terrible et j'ai l'impression que ça n'ira jamais mieux.							
4. Je trouve que c'est affreux et j'ai l'impression que la douleur m'écrase.							
5. Je prie Dieu ou le destin pour que ma douleur ne dure pas.							
6. J'essaie de penser à la douleur comme si elle était séparée de mon corps.							
7. Je ne prête pas attention à la douleur.							
8. Je fais comme si je ne souffrais pas.							
9. J'ai peur que la douleur ne cesse pas.							
10. Je repense à des moments agréables du passé.							
11. Je pense à des personnes avec lesquelles j'aime faire des choses.							
12. Je prie pour que la douleur disparaisse.							
13. J'imagine que la douleur est en dehors de mon corps.							
14. Bien que j'aie mal, je continue mes activités.							
15. J'ai l'impression que je ne peux plus supporter la douleur.							
16. Je recherche la compagnie des autres, j'essaie de ne pas rester seul(e).							
17. J'ignore la douleur.							
18. Je compte sur ma foi en Dieu ou dans le destin.							
19. J'ai l'impression de ne plus pouvoir aller de l'avant.							
20. Je pense à des choses que j'aime faire.							
21. Je fais comme si la douleur ne faisait pas partie de moi.							

Coping Strategies Questionnaire

Instructions: When you are in pain, you may react in different ways. Please indicate for each of the following strategies, if you use it to cope with your pain

When I have pain,	0 Never do that	1	2	3 Sometimes do that	4	5	6 Always do that
1. I try to distance myself from the pain, as if it were in someone else's body.							
2. I try to think about something pleasant.							
3. I think that it's very bad and I have the impression that it will never be better.							
4. I think that it's awful and I have the impression the pain taking over.							
5. I pray to God or faith that the pain doesn't last.							
6. I try to think of the pain as if it were separated from my body.							
7. I do not pay attention to the pain.							
8. I do as if I wasn't suffering.							
9. I am afraid that the pain won't stop.							
10. I think of pleasant moments from the past.							
11. I think of people I like doing stuff with.							
12. I pray that the pain disappears.							
13. I imagine that the pain is outside my body.							
14. Although I am in pain, I continue doing activities.							
15. I have the impression that I can no longer endure the pain.							
16. I try to be in others company, so as to not be alone.							
17. I ignore the pain.							
18. I rely on my faith in God or destiny.							
19. I have the impression of no longer being able to go forward.							
20. I think of doing things I like to do.							
21. I do as if the pain wasn't part of me.							

APPENDIX H

Échelle de satisfaction de vie (SWLS)

Cocher 1 pour **Pas du tout d'accord**	Cocher 2 pour **Pas d'accord**	Cocher 3 pour **Plutôt pas d'accord**	Cocher 4 pour **Avis partagé**	Cocher 5 pour **Plutôt d'accord**	Cocher 6 pour **D'accord**	Cocher 7 pour **Tout à fait d'accord**

Votre réponse							
	1	2	3	4	5	6	7
1. En général, ma vie correspond de près à mes idéaux							
2. Mes conditions de vie sont excellentes							
3. Je suis satisfait(e) de ma vie							
4. Jusqu'à maintenant, j'ai obtenu les choses importantes que je voulais de la vie							
5. Si je pouvais recommencer ma vie, je n'y changerais presque rien							

Satisfaction with Life Scale

Below are five statements that you may agree or disagree with. Using the 1 - 7 scale below, indicate your agreement with each item by checking the appropriate number. Please be open and honest in your responding.

Check 1 for **Strongly disagree**	Check 2 for **Disagree**	Check 3 for **Slightly disagree**	Check 4 for **Neither agree nor disagree**	Check 5 for **Slightly agree**	Check 6 for **Agree**	Check 7 for **Strongly agree**

	Your Answer						
	1	2	3	4	5	6	7
1. In most ways my life is close to my ideal.							
2. The conditions of my life are excellent.							
3. I am satisfied with my life.							
4. So far I have gotten the important things I want in life.							
5. If I could live my life over, I would change almost nothing.							

APPENDIX I

Sous-échelle sur le support social au travail

du Job Content Questionnnaire (JCQ)

	Fortement en désaccord	En désaccord	D'accord	Fortement en accord
1. Mon supérieur immédiat se soucie du bien-être des personnes qui sont sous sa supervision.	☐	☐	☐	☐
2. Mon supérieur immédiat prête attention à ce que je dis.	☐	☐	☐	☐
3. Mon supérieur immédiat facilite la réalisation du travail.	☐	☐	☐	☐
4. Mon supérieur immédiat réussit à faire travailler les gens ensemble.	☐	☐	☐	☐
5. Les gens avec qui je travaille sont qualifiés pour les tâches qu'ils accomplissent.	☐	☐	☐	☐
6. Les gens avec qui je travaille s'intéressent personnellement à moi.	☐	☐	☐	☐
7. Les gens avec qui je travaille sont amicaux.	☐	☐	☐	☐
8. Les gens avec qui je travaille facilitent la réalisation du travail.	☐	☐	☐	☐

Social Support at Work Subscale of the Job Content Questionnaire (JCQ)

	Strongly Disagree	Disagree	Agree	Strongly Agree
1. My immediate superior is concerned of the well-being of the people under his/her supervision.	☐	☐	☐	☐
2. My immediate superior pays attention to what I say.	☐	☐	☐	☐
3. My immediate superior facilitates the realization of the work.	☐	☐	☐	☐
4. My immediate superior succeeds in getting everyone to work together.	☐	☐	☐	☐
5. The people with whom I work are qualified for the tasks they are assigned to.	☐	☐	☐	☐
6. The people with whom I work are personally interested in me.	☐	☐	☐	☐
7. The people with whom I work are amicable.	☐	☐	☐	☐
8. The people with whom I work facilitate the realization of the work.	☐	☐	☐	☐

APPENDIX J

Questionnaire sur le retour au travail (T1)

1. Numéro du client: ___
2. Date de l'entrevue: (Jour/mois/année) ____ /____/_____
3. Numéro de téléphone:_____
4. Allez vous retourner au travail à la suite du programme de réadaptation PSP? (Encerclez ou soulignez votre choix)

Oui	Non	Non, car je ne travaillais pas avant mon accident

Autre (précisez):

_____

5. Si non, est-ce à cause de votre condition?

Oui	Non

6. Si oui, quelle est la date prévue de retour au travail?

(Jour/mois/année) ____ /____/_____

7. Si oui, allez vous retourner à votre ancien emploi?

Oui	Non

8. Est-ce que vous allez faire le même travail qu'avant votre accident?

Oui	Non

Autre (précisez):

_____

_____

9. Si non, décrivez votre nouveau travail:

_____

_____

10. Nombre d'heures que vous allez travailler par semaine: _____

Questionnaire on Return to Work (T1)

1. Client's number: _____
2. Date of the interview: (Day/month/year) ____ /____/_____
3. Telephone number:_____
4. Are you going to return to work after the end of your participation in the PSP rehabilitation program? (Circle or underline your choice)

Yes	No	No, because I wasn't working before my accident

Other (please, specify):

_____

5. If not, is it because of your condition?

Yes	No

6. If yes, what is the expected date of going back to work?

(Day/month/year) ____ /____/_____

7. If yes, are you going to return to your former place of work?

Yes	No

8. Are you going to do the same job as before your accident?

Yes	No

Other (please, specify): _____

_____

9. If not, describe your new occupation:

_____

_____

10. Number of hours that you will work per week: _____

APPENDIX K

Questionnaire sur le retour au travail (T2)

1. Numéro du client: ___
2. Date de l'entrevue: (année/mois/jour) ____/____/_____
3. Questions 3a – 3d pour ceux qui ont retourné au travail:
    1. Avez-vous gardé votre emploi? Oui / Non
    2. Si non, avez-vous trouvé un autre emploi? Oui / Non
    3. Si oui, décrivez votre nouvelle occupation:

_____

_____

    4. Nombre d'heures de travail par semaine: _____
4. Question 4a – 4f pour ceux qui n'ont pas retourné au travail à la suite de PSP:
    5. Avez-vous retourné au travail? Oui / Non
    6. Si non, est-ce à cause de votre condition? Oui / Non
    7. Si oui, quand? (année/mois/jour) ____/____/_____
    8. Avez-vous retourné à votre ancien emploi? Oui / Non
    9. Est-ce que vous allez faire le même travail qu'avant votre accident?

Oui	Non

Autre (précisez):

_____

_____

    10. Si non, décrivez votre nouveau travail:

_____

_____

    11. Nombre d'heures de travail par semaine: _____

Questionnaire on Return to Work (T2)

1. Client's number: _____
2. Date of the interview: (Day/month/year) ____ /____/_____
3. Questions 3a – 3d for those who returned to work:
    a. Did you keep your job? Yes / No
    b. If not, did you find another one? Yes / No
    c. If yes, describe your new occupation:

_____

_____

    d. Number of hours worked per week: _____
4. Questions 4a – 4f for those who didn't return to work after PSP:
    a. Have you returned to work? Yes / No
    b. If not, is it because of your condition? Yes / No
    c. If yes, when? (Day/month/year) ____ /____/_____
    d. Have you returned to your former place of work? Yes / No
    e. Are you doing to do the same job as before your accident?

Yes	No

Other (please, specify):

_____

_____

    f. If not, describe your new occupation:

_____

_____

    g. Number of hours worked per week: _____

APPENDIX L

ANNEXE II

A) Déclaration des coauteurs d'un article

Lorsqu'un étudiant n'est pas le seul auteur d'un article qu'il veut inclure dans son mémoire ou dans sa thèse, il doit obtenir l'accord de tous les coauteurs à cet effet et joindre la déclaration signée à l'article en question. Une déclaration distincte doit accompagner chacun des articles inclus dans le mémoire ou la thèse.

1. Identification de l'étudiant et du programme

Nom de l'étudiant: Petko Baltov
Sigle et titre du programme, en indiquant l'option s'il y a lieu: M.Sc. Sciences biomédicales (option réadaptation)

2. Description de l'article

Auteurs: Petko Baltov, Julie Côté, Manon Truchon, Dorcas Beaton, Debbie Feldman
Titre: Psychosocial factors associated with outcomes for patients undergoing rehabilitation for chronic whiplash associated disorders
Revue: Disability and Rehabilitation
Date probable de soumission: Mai 2007

3. Déclaration de tous les coauteurs autres que l'étudiant

À titre de coauteur de l'article identifié ci-dessus, je suis d'accord pour que Petko Baltov inclue cet article dans son mémoire de maîtrise qui a pour titre 'Psychosocial factors associated with outcomes for patients undergoing rehabilitation for chronic whiplash associated disorders'

[redacted] 17 Janvier 2007

Coauteur Signature Date

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[redacted] 22/01/07

Coauteur Signature Date

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[redacted] 31/01/2007

Coauteur Signature Date

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[redacted] 19 janvier 2007

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